The Magazine for Amateur Radio and Computerists

CM

June/July, 1987
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The Battery Topper

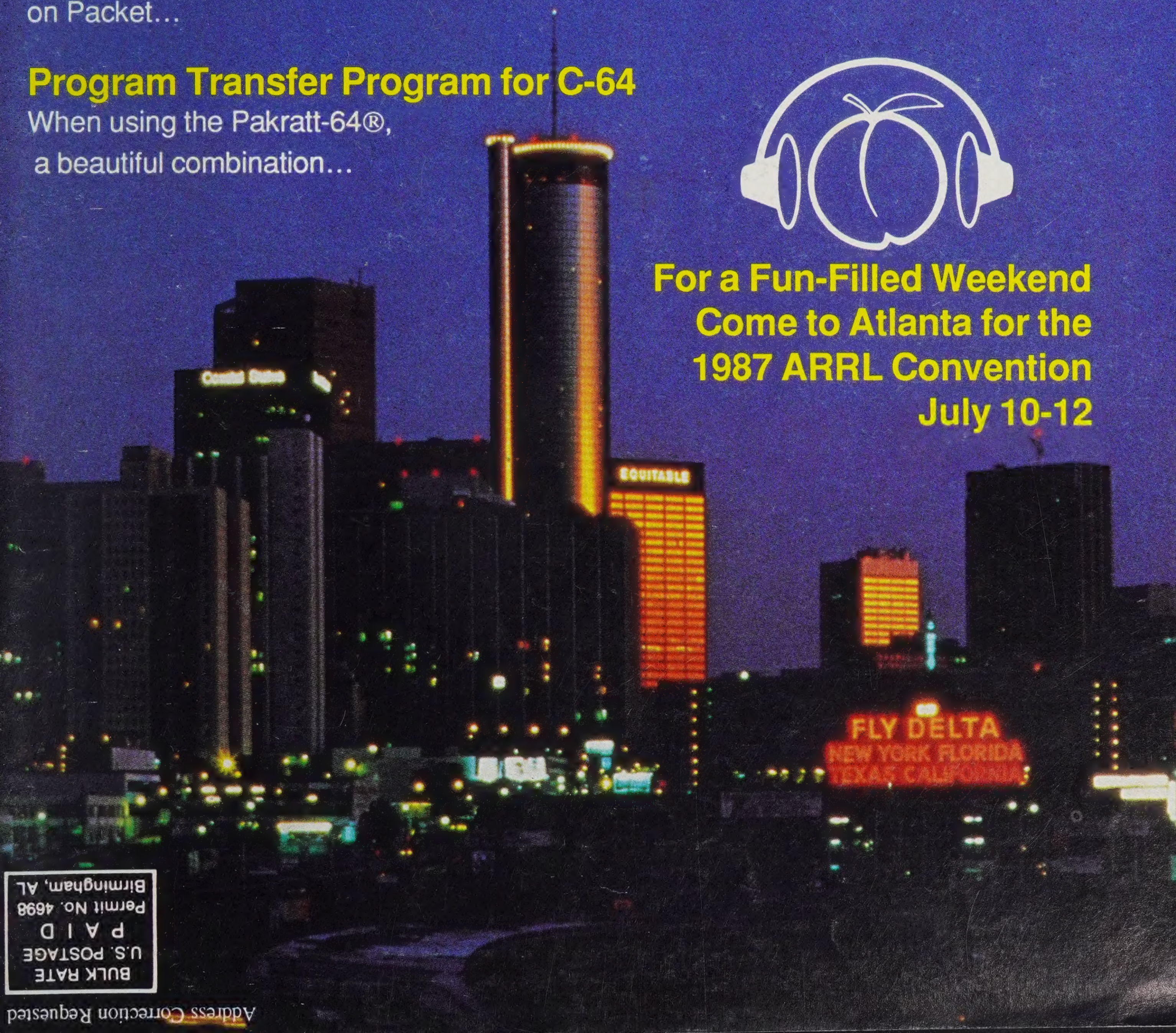
Use FREE power for your hamming needs

Making the Connection

Understanding the facets of the "connection" on Packet…

Program Transfer Program for C-64

When using the Pakratt-64®, a beautiful combination…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KENWOOD

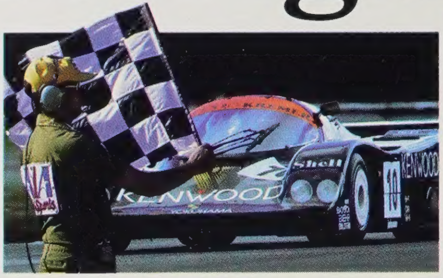
...pacesetter in Amateur radio

First Again!

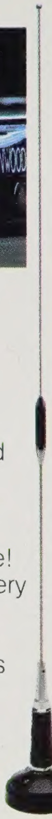
TW-4100A

2 m/70 cm FM Dual Bander

A Kenwood original just got better! Kenwood was the first to develop a 2 m/70 cm mobile radio in a single, compact package. Since then, other companies have imitated the concept, but still have not done it the "Kenwood way." The all-new TW-4100A is more compact, more powerful, and packed with more features than ever before! With many new features and accessories, and backed by Kenwood's experience, the all-new Kenwood Dual Bander is light years ahead of the rest!



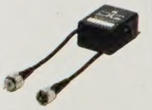
- **Selectable full duplex cross band ("telephone style") operation.** Remote base or cross band repeater function possible (a control operator is needed for remote or repeater operation*).
- **45 watts on 2 m. 35 watts on 70 cm.** 5 watts (adjustable) low.
- **Frequency coverage: 142-149 MHz (allows operation on certain MARS and CAP frequencies) and 440-449.995 MHz.**
- **New compact size!** Only 5.9″ W x 1.97″ H x 7.87″ D and weighs less than 4 pounds!
- **Proven high performance Kenwood GaAs FET front end receiver.**
- **Easy to operate!** Only 3 knobs and 8 keys on the front panel.
- **Separate antenna ports for VHF and UHF.** Minimizes loss and increases reliability and performance!
- **10 memory channels.** Lithium battery backs up memory. Store frequency, offset, subtone. Two channels store the transmit and receive frequencies independently **for odd split or cross band operation.**
- **Front panel-selectable CTCSS tone (when optional TU-7 is installed.)**

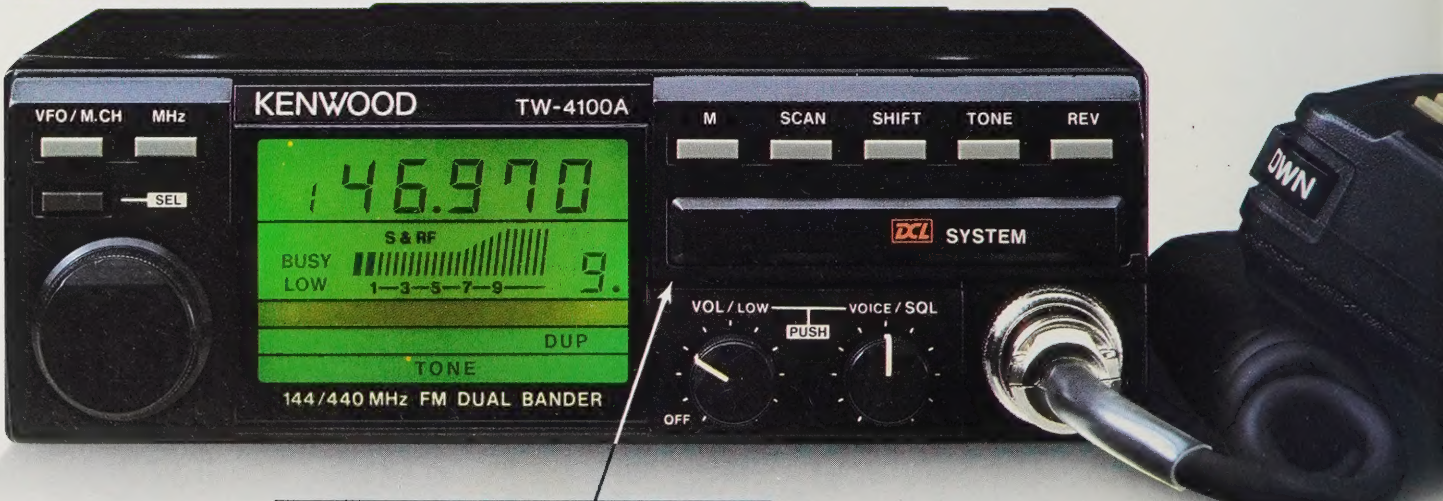


- **Non-volatile operating system.** Even after memory back up cell dies, all operating features remain intact! No re-programming or "board-swapping" necessary!
- **Programmable band scan and memory scan with memory channel lock-out.**
- **Large, illuminated LCD display and main knob.** For excellent visibility in direct sunlight or darkness.
- **Selectable frequency step for quick and easy QSY.**
- **Voice synthesizer VS-2 option.**

Optional accessories:

• **PS-50/PS-430** DC power supplies • **MU-1** DCL modem unit • **TU-7** CTCSS encoder • **VS-2** Voice synthesizer • **SW-100B** SWR/Power/Volt meter 140-450 MHz for mobile use • **SW-200B** SWR/Power meter for base station use 140-450 MHz. 0-200 W in 2 ranges • **SWT-1/SWT-2** 2 m and 70 cm antenna tuner • **SP-40** Compact speaker • **SP-50B** Mobile speaker • **PG-2N** Extra DC cable • **PG-3B** DC noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MC-55** (8-pin) Mobile microphone • **MA-4000** Dual band mobile antenna with duplexer (mount not included) • **MB-11** Extra mobile mount





CS
C.SQ
RESET
CHL
DCL

• **Digital Channel Link (DCL) option.**

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1111 West Walnut Street
Compton, California 90220

**Please check FCC regulations on repeater operation.*
Minor modification necessary for repeater operation.
Specifications and prices subject to change without notice or obligation.
Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.

KENWOOD

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ALL NEW FM mobile!

Here's One for You!

TM-221A/421A

2 m and 70 cm FM compact mobile transceivers

The all-new TM-221A and TM-421A FM transceivers represent the "New Generation" in Amateur radio equipment. The superior Kenwood GaAs FET front end receiver; reliable and clean RF amplifier circuits, and new features all add up to an outstanding value for mobile FM stations! The optional RC-10 handset/control unit is an exciting new accessory that will increase your mobile operating enjoyment!

- **TM-221A provides 45 W. TM-421A is the first 35 W 70 cm mobile!** Both models have adjustable 5 W low power.
- **Selectable frequency steps** for quick and easy QSY.
- **TM-221A receives from 138-173.995 MHz. This includes the weather channels!** Transmit range is 144-148 MHz. Modifiable for MARS and CAP operation. (MARS or CAP permit required.)
- **The TM-421A covers 438-449.995 MHz.** *(Specifications guaranteed for Amateur band use only.)*
- **Built-in front panel selection of 38 CTCSS tones.** TSU-5 programmable decoder optional.
- **Simplified front panel controls**—makes operating a snap!
- **16 key DTMF hand mic., mic. hook, mounting bracket, and DC power cable included.**
- **Packet radio compatible!**
- **Kenwood non-volatile operating system.** All functions remain intact even when lithium battery back-up fails. (Lithium cell memory back-up—est. life 5 yrs.)
- **14 full-function memory** channels store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2 m is automatically selected.** There are **two channels** for "odd split" operation.
- **Programmable band scanning.**
- **Memory scan with memory channel lock-out.**
- **Super compact:** approx. 1-1/2"Hx5-1/2"Wx7"D.
- **New amber LCD display.**
- **Microphone test function on low power.**
- **High quality, top-mounted speaker.**
- **Rugged die-cast chassis and heat sink.**

UP
VFO/M
M.IN
MHz
KENWOOD
144MHz FM TRANSCEIVER TM-221A
CTCSS TONE
146.970
1
BUSY
OVER
VOL
SQL
LOW
POWER
SHIFT
REV
SCAN
CTCSS
TONE

RC-10 Remote Controller

Optional telephone-style handset remote controller RC-10 is specially designed for mobile convenience and safety. All front panel controls (except DC power and RF output selection) are controllable from the RC-10. One RC-10 can be attached to **either or both** TM-221A and TM-421A with the optional PG-4G cable. When both transceivers are connected to the RC-10, **cross band, full duplex repeater** operation is possible. (A control operator is needed for repeater operation.)

Optional Accessories:

- **RC-10** Multi-function handset remote controller
- **PG-4G** Extra control cable, allows TM-221A/TM-421A full duplex operation
- **PS-50/PS-430** DC power supplies
- **TSU-5** Programmable CTCSS decoder
- **SW-100A** Compact SWR/power/volt meter (1.8-150 MHz)
- **SW-100B** Compact SWR/power/volt meter (140-450 MHz)
- **SW-200A** SWR/power meter (1.8-150 MHz)
- **SW-200B** SWR/power meter (140-450 MHz)
- **SWT-1** Compact 2 m antenna tuner (200 W PEP)
- **SWT-2** Compact 70 cm antenna tuner (200 W PEP)
- **SP-40** Compact mobile speaker
- **SP-50B** Mobile speaker
- **PG-2N** Extra DC cable
- **PG-3B** DC line noise filter
- **MC-60A, MC-80, MC-85** Base station mics.
- **MC-55** (8-pin) Mobile mic. with gooseneck and time-out timer
- **MA-4000** Dual band antenna with duplexer (mount not supplied)
- **MB-201** Extra mobile mount

Specifications and prices subject to change without notice or obligation.
Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.

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YES! 220 MHz

220: Kenwood Style!

TM-3530A

The first comprehensive 220 MHz FM transceiver

TM-3530A—25 watts of 220 MHz FM—Kenwood style! Features include built-in 7-digit telephone number memory, auto dialer, direct frequency entry and big LCD. All this makes the TM-3530A the most sophisticated rig on 220 MHz!

- **First** mobile transceiver with telephone number memory and auto-dialer (up to 15 seven-digit telephone numbers)
- Frequency range 220-225 MHz
- Automatic repeater offset selection—**a Kenwood exclusive!**
- Direct keyboard entry of frequency
- 23-channel memory for offset, frequency and sub-tone
- Big multi-color LCD and back-lit controls for excellent visibility
- Optional front panel programmable 38-tone CTCSS encoder **includes 97.4 Hz**
- Frequency lock switch
- Digital Channel Link (DCL) option
- High performance GaAs FET front end receiver

TH-31BT/31A

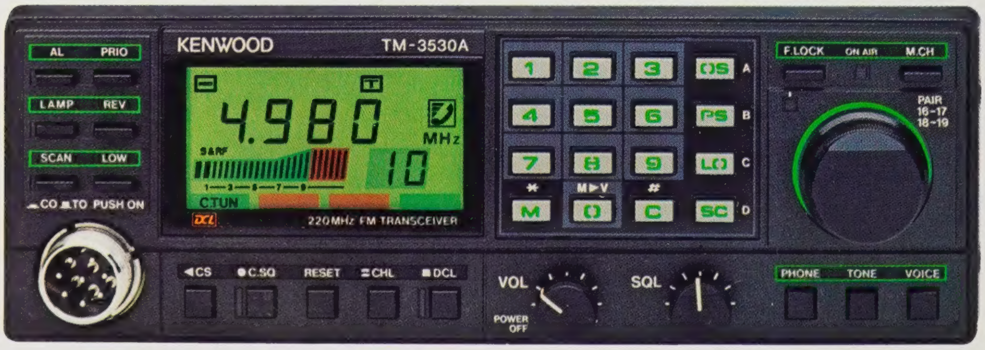
Kenwood's advanced technology brings you a new standard in pocket/handheld transceivers!

- 1 watt high, 150 mW low
- Super compact and lightweight (about 8 oz. with PB-21!)
- Frequency range 220-224.995 MHz in 5-kHz steps
- BT Series has built-in tone
- Repeater offset: −1.6 MHz, reverse, simplex
- **Supplied accessories:** rubber flex antenna, earphone, wall charger, 180 mAH NiCd battery and wrist strap
- Quick change, locking battery case

TH-31BT/31A optional accessories:

- **HMC-1** headset with VOX
- **SMC-30** speaker microphone
- **PB-21** NiCd 180 mAH battery
- **PB-21H** NiCd 500 mAH battery
- **DC-21** DC-DC converter for mobile use
- **BT-2** manganese/alkaline battery case
- **EB-2** external C manganese/alkaline battery case
- **SC-8/8T** soft cases with belt hook
- **TU-6** programmable sub-tone unit
- **AJ-3** thread-loc to BNC female adapter
- **BC-6** 2-pack quick charger
- **BC-2** wall charger for PB-21H
- **RA-9A** StubbyDuk antenna
- **BH-3** belt hook

- 16-key DTMF pad, with audible monitor
- Center-stop tuning—**another Kenwood exclusive!**
- **New** 5-way adjustable mounting system
- **Unique** offset microphone connector—relieves stress on microphone cord
- HI/LOW power switch (adjustable LOW power)



KENWOOD
220MHz FM TRANSCEIVER
TH-31BT

TH-31BT with DTMF pad shown. Optional RA-9A attached.

TM-3530A optional accessories:

- **TU-7** 38-tone CTCSS encoder
- **MU-1** DCL modem unit
- **VS-1** voice synthesizer
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MB-10** extra mobile bracket
- **CD-10** call sign display
- **PS-430** DC power supply
- **MC-60A/MC-80/MC-85** desk mics.
- **MC-48B** extra DTMF mic. with UP/DOWN switch
- **MC-43S** UP/DOWN mic.
- **MC-55** (8 pin) mobile mic. with time-out timer
- **SP-40** compact mobile speaker
- **SP-50B** mobile speaker
- **SW-200B** SWR/power meter
- **SW-100B** compact SWR/power meter

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Novices Congratulations!

You have worked very hard in getting your NOVICE TICKET. The road ahead must seem to be almost unobtainable, but it isn't, with the proper information. That is where CTM Magazine can help. CTM is the only magazine dedicated in bringing you information on how your home computer can give you many hours of enjoyment when used with your ham equipment. We are also the Number One Source of PACKET Information.

To assist you in learning more about your newly found hobby, just send this page along with a copy of your novice ticket and we will send you a FREE copy of CTM. In fact, send us a copy of your upgraded ticket and we will send you another FREE copy or add an EXTRA MONTH to your subscription.

To take advantage of this offer, YOU MUST SEND A COPY OF YOUR TICKET WITHIN 1 MONTH OF THE DATE ON THE TICKET. Due to large number of new licenses being issued each month, we MUST place a limitation on this offer. This offer may be suspended without notice at any time.

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You only lose if you don't take advantage of this OFFER!

Get a FREE issue of CTM

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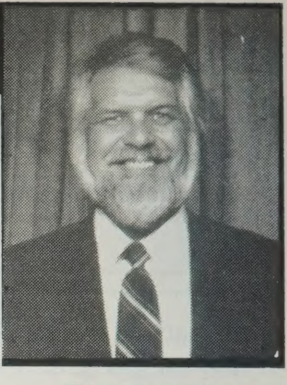
(An Editorial and just plain talk)

Chet's Chats



Chet Lambert
W4WDR

We Have T-S Horizons Mailing List Now

I received T-S Horizons mailing list from Rick Duncan on June 15th. It will take some time to go over the list and make the necessary adjustments which will be necessary for those of you who were subscribers to both magazines. As I said last month, if you were subscribers to both, and had, lets say, 3 months left on T-S Horizons, that 3 months will be added to your subscription of **CTM.** And, if the person listed isn't a **CTM** subscriber, then that person will received 3 months of **CTM.**

You can't imagine the work involved in making this transistion. Rick was using a mailing list completely different from the one I'm using. He didn't have all the information I use, so each of the names will have to be entered by hand. It will take time.

I am hoping to have this work completed by the next issue. But, as I said above, it will take time and if I don't have it all completed by then, just stand by me until I can get it all done.

You realize of course, when this mailing list has been transferred over to the **CTM** mailing list, it will give us the most subscribers for any T/S publication I am aware of. And, we will be the only monthly T/S magazine, eventhough we cover more, much more than the T/S computers. That should make T/S advertisers happy. I had hoped the announcement of this merger at the recent Timex/Sinclair Computer Fest would have produced inquiries from advertisers but, so far, nothing.

When I talked to Rick recently, he told me he would be sending over some of the articles he has ready and would have had in his next issue of T-S Horizons. Rick will be providing articles from his writers and of his own. So, you all should be very happy to know Rick is completely leaving the T/S computers and his following. I must admit, I will be happy to get his first articles. And, I bet you will be happy too…

CTM Double Issue

As I told you last month, I was going to make this a June/July issue. As you can see this I did. It won't affect your subscription though. You will still get a full 12 issues.

I am sorry to have to have a double issue, I was really hoping that this year I could do the full 12 in one year. But, when I took time to do our special BirmingHAMfest program, it just took more time than I had allocated. Those of you who have seen a copy of the program will have a better understanding of the work involved with such an undertaking. I am proud of how it turned out and without the help of Jim, it would have been nearly impossible.

CTM on Audio Tape

I have to admit, I haven't checked into the number of tapes mailed to visually impaired persons through the VA Southeastern Rehabilitation Center here in Birmingham.

It was a nice plus for **CTM** to be asked for this honor.

I hope many will benefit from this association with the Rehabilitation Center.

Audio tapes can be obtained by sending only $3.00 to the **USVA SBRC Amateur Radio Club 124, 700 19th Street South, Birmingham, AL 35233.**

CTM Renewals

As I have told you in the past, how difficult it is for me to update the mailing list on renewals or change of addresses.

Jim Pittman is redoing our mailing list in dBase III in PC/DOS and it will allow me to do a search much faster than my current mailing list which in in dBase II in CP/M. After he gets it going, I will be able to make the changes immediately rather like I do now which is to wait until getting ready to make the mailing.

Jim has been a real great help to me recently by doing some of the keyboarding of articles, working with the PC MacBridge and the BirmingHAMfest program. I don't know how I could get along without him. I guess I could, **if** I had about 1/10th of his computer knowledge.

Mailing Label

You have noticed I bet, your mailing label placement has changed. That was by direction of the Post Office. The previous label was incorrectly placed and after working it out with the post office, it was decided to move the indicia to the front cover. I like the move for a several reasons. One, the post office directed it, I may be dumb but I ain't stupid. Two, it frees the entire rear cover for ICOM of America who has current dibs on it. Thirdly, I think it looks good on the front cover and the placement doesn't interfere with the cover layout. This new location should work out fine.

Electronic Program

I did get an electronic program to be used with my Mac but I just got it and haven't had time to look at it closely. I am not too sure if it will work like I want but at least I have something and with practice, it may do just fine. Thanks Bill for sending the program to me and naturally, I will let you know just how effective it is.

The program I was looking for is out of Florida and is for making full schematic using the Mac. I would still like to find out where that program can be obtained. It seems from what I have heard, it is the program I need.

Packetalker

Thanks to the many of you who have contacted me concerning the Packetalker. I will be real happy to get reports from you who have actually put a Packetalker together from the article. Letting me know just how it works, how difficult it was in putting together etc.

Several of you were concerned with the poor quality of the schematic, but that is what I was provided and had to use that. From reading the article and I haven't talked to Roger about it, but I think the schematic comes with the chips to be used in the article. I may be wrong but I think that is what is supposed to happen. The smaller schmetics in the lower part of the larger schematic are for changes only.

Roger or someone may correct me on my assumptions…

PageMaker ® V. 2.0

I am real happy to say, I now have the new PageMaker version 2.0 in my possession. I am planning on using it for this issue. I have to install it and learn to use the new additions. It should really help me with getting out **CTM** each month. And, with the new improvements it should make each issue better looking.

The people at Aldus Corporation who produce PageMaker have really worked hard on the new version and I have really been looking forward in using it.

They also have a version for IBMs and compatible. When I found out about the PC version, I went and got a PC AT clone so I can try out the PC version.

Remember I told you long ago, I traded advertising for the my Mac version and I am hoping that I can get a copy of the AT version using the same methods. At this point I am not sure if I will get a copy or not but I sure hope so, since I went and got an AT clone primarily for the PC version.

I'm Trying to get on the "Air"

CTM has taken so much of my time over the past few years, I haven't had time to get on the air. And I don't like that. Ham radio has been one of the most important things in my life and I miss it.

I am trying to get my station back on the air. When my son, Alan was home on leave from the U.S. Air Force, he and Jim Pittman took down my old antennas. And I am working to get my new Mosley Pro 67 installed on my tower. I have an 80' Rhon tower but it seems the tree along side the tower wants to keep growing encroaching on the antenna. Therefore I am going to put up another 10' section plus a new top section to put the antenna us a few more feet.

It will be so good to get back on the air. I love to rag chew and also chase DX. Having been a DX station from several points of the compass, I understand DX chasing from both sides of the microphone.

Hamfest Chattanooga Changes Location

Nita Morgan told me at Ham-Com they had to change location for Hamfest Chattanooga October 24 & 25. They have moved from the Trade Center over to the world famous **Chattanooga Choo-Choo.** They will be holding the event in an ice skating rink, which is a part of the Choo-Choo complex, I think. Nita said there was sufficient room for the event including their normally large flea market.

Chet Needs Help

No, not the kind of help you are use to hearing about. This time I need help in locating something for our camping trailer we take to the various shows we go to.

We have a 1983 Monitor 28' and need a rear gravel shield. I have looked in all of the places around this area so, I thought, why not ask my **CTM** family who live all over the country.

If any of you are around your camper dealer who repairs campers, how about asking him if he has or knows where we can get a used, but good gravel shield for the above. It is UPS shippable when broken down into two pieces. I would appreciate your help.

Our old camper had this shield but this one doesn't and Teenie and I miss it and would like to get one.

If you can help us, please call or write and I will take it from there.

Past Shows

BirmingHAMfest, Alabama

This, as you know, is the hamfest of my home club, Birmingham Amateur Radio Club. The BirmingHAMfest is our annual affair we all look forward to. And, I have been involved with it for several years, however, since I have been working on **CTM** my involvement had, until this year, diminished to nearly non-involvement. However, this year was different, I worked on the printed program including selling ads, selling booth space, selling our VIP flea market tables and getting many of the prizes.

We tried something new this year which I believed to be new to hamfest until I talked with Van of H.C. VanValzah Company "The Antenna Man". We had three areas for selling: normal dealer area, flea market and the new area we called VIP flea market area.

The dealer area was for companies who wanted draped booths and electricity. Then we had a normal flea market area where only used equipment was sold (or was supposed to be) and the new VIP flea market. This new area was for smaller companies who didn't want the draped booths and were selling new equipment. They were provided power when requested and for that they paid more.

We had some problems as can be expected when you try something new. We had three dealers in the VIP flea market who were selling more used equipment than new and this shouldn't have happened. Then in the flea markert where only used equipment was being sold, we had some dealers who were selling more new equipment than used. In fairness to the them, the problem wasn't totally theirs. It wasn't a real big problem but it was a problem.

The main problem, as I saw it, was with the location. We had moved to a new building which, in my opinion, wasn't good. The flea market was upstairs separated from the dealer and VIP flea market area. This turned out to be a problem for several reasons. Unloading and loading was one of the main reasons.

I talked to several dealers concerning their overall profits and all but one, a local computer dealer, did well and some better than they did last year. So if you use only profit as the measure of the hamfest, it was good, but if you take into consideration of all the facts, it wasn't that good.

In talking with Van "The Antenna Man", I found the three tier selling areas isn't new. hamfest in the mid-west and northeast have been using that strategy for years and it has been good. Van likes the idea and feels we should continue that part of our hamfest.

The main suggestion he had was to let the companies select the area in which they want to sell in, like they do at Dayton. In Dayton, companies can be anywhere they want as long as space allows it. Some companies will have dealer booths inside and spaces in the flea market area too. Their pocket book dictates where they want to be. I feel this is a good solution to a problem.

In our club, I was one of the strongest supporters of the three selling areas. I am sorry it didn't work out this year.

I am for moving our hamfest back to the fair ground where it had been for several years before we moved it to our convention center. And, again, I was one of the moving forces in making the move from the fair grounds to the convention center. At the fair ground they have a new building where the dealer area would be and it is large enough to handle the hamfest for several years to come. The flea market area would be in the building next to it connected by a very large door. There is even enough space for tailgaters if there is sufficient interest in an outside flea market. Then they also have around 40 spaces, I think, for full camper hook-ups. And, as you know, I strongly believe in providing space for campers. Only time will tell just where the BirmingHAMfest will be held in 1988.

One thing I nearly forgot, I was lucky and won the second prize which was a Azden PCS-5000 two meter transceiver. Since I have so many two meter rigs, I traded it back to Ack Radio here in Birmingham where it came from for things I do need. That's where I am getting my tower sections etc. to get my antenna back up in the air. So, I am real pleased with the prize or rather what it represents for me... getting back on the air!

We, CTM did well in selling magazines, getting subscriptions including renewals and selling some of our equipment. But my personal overall opinion of the hamfest was that it wasn't nearly asgood as it has been in the past.

Knoxville (TN) Hamfest

Teenie and I drove up to Knoxville for their hamfest. We went up with the intention of staying only Saturday, leaving an option of staying Sunday if we thought it would have been beneficial for us. It wasn't. We left Saturday afternoon.

The hamfest is small as I have said and in my estimation would make a good one day hamfest. That was my evaluation from last year and it is still my opinion. We may or may not attend next year, but if we do, it will be for Saturday only.

We did fairly well Saturday in selling magazines and getting renewals and some new subscriptions. Luckily I didn't find anything to buy.

COMDEX Atlanta

I didn't make Comdex this year. I was working on the May issue. However, we do have a short review of the show in this issue by Dave Garner, WA4YRK. Dave was fortunate in being able to attend and we are furtunate enough to get his thoughts on the 2nd largest of the computer shows. Comdex in Las Vegas is much much larger. And that one Teenie and I did get to go. Remember it was right after Ham/West last year.

I always like to go to Comdex but I just couldn't get away this time.

Coming Events

Atlanta Hamfest (ARRL National Convention)

Strange as it may seem, I don't have real good feelings about this hamfest eventhough it is the National ARRL Convention. Atlanta has been going down in quality for the past several years and I thoroughly enjoy going and being there. I feel just a comfortable on their repeaters as I do here in Birmingham.

One word of caution is necessary. The advertisments for this hamfest is most confusing in that, it appears that this will be a three-day show. **It isn't:... it is a two-day show... It is on Saturday and Sunday ONLY.** Friday is for dealer and flea market set-up only. The exhibits will not be open to the public. There are some club groops meeting as a convience but they are not an official part of the hamfest. I hope to see you there both Saturday and Sunday. Come by the booths and say howdy!

At Dayton this year, in our industry meeting, we tried to identify the 10 best hamfest in the country. We couldn't come up with but seven I think: (1) Dayton, of course (2) Miami (3) Orlando and they may have been tied with each other (4) Charlotte, (5) Dallas (6) Atlanta and some even questioned that position (7) Boxboro, which is only every other year. Ham/West was mentioned but since it is no longer in existance, it can't be considered.

Did you notice that all of these hamfest are east of the Mississippi River but Dallas. It is strange there aren't any big hamfest out west. Oh well, I got a little off subject.

What worries me about Atlanta is eventhough it is only a few weeks away, I haven't even been told what my booth numbers are and the decorating company hasn't contacted me either. It being a national convention, I would have thought these things would have been taken care of weeks ago. I spoke to several people from different companies at Dallas and they too, haven't been contacted.

Eventhough I have these feelings, I am still looking forward to it and I sincerely hope I am wrong, fully wrong...

Jacksonville (Fl) Hamfest

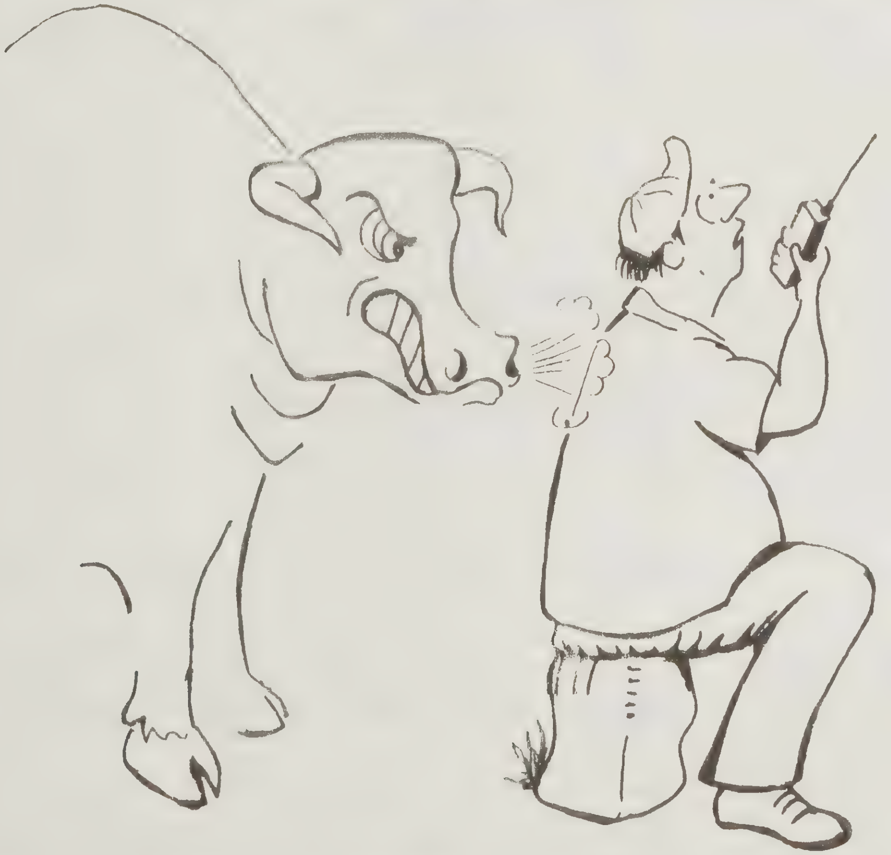
As of this writing, we are planning on attending this hamfest. We have been there for the past several years. This year they have moved into a new location which should really enhance the hamfest. The city completely renovated the old train station, I think, and made a convention center out of it. Regardless it should be better and I hope to see you there too!

Huntsville (Al) Hamfest

This is one of the best hamfest we attend each year. They have worked so hard for the event and the hard work shows throughout the show. The show is professionally run and the falicities are just great. Next year they will be enlarged by 20,000 square feet and that should really help the crowded conditions.

This is one show Teenie and I really look for.

It is just a **Great Hamfest! CTM**



We are starting something new this month. We hope to have a new untitled cartoon each month and will have a small contest. The contest is very simple, yep, you got it! We are looking for a caption. Send in your caption and if you win you will get an additional 6 months added to your subscription. If a permanent subscriber (1299er) wins they can give the 6 months sub to someone or perhaps their local school library. (Just an suggestion)

By Buck Rogers, K4ABT

Converse and Transparent

Making the Connection

Having laid the ground work for this months topic with the short sub-title above, I will digress for a meoment into last months *Converse & Transparent*. In describing my new-found form of data handling; (2400 Baud QPSK) I now find myself up to my ears in letters and calls. Most are approving, while some have mixed feelings. I plan to put these letters together into a Q & A forum, so to speak, and make a future article of them.

Now for this months topic; I receive many questions about how I set up my packet station. Some are concerned about how to connect the terminal to the Packet Controller. Still others want to know the configuration scheme that I use. It is quite obvious, these two topics go hand-in-hand, so lets take them in order, but in two sections. (All in one issue of **CTM,** makes it easy to refer back to later)

TNC: The Purpose

The most misunderstood part of our packet hobby is the manner in which we make our connections to the packet interface and the way we then configure it. There are a few acronynms I will be using in the text so be prepared to recognize them.

They are:

DTE= Data Terminal Equipment

DCE= Data Communications Equipment

RTS = Request To Send

CTS = Clear To Send

DCD = Data Carrier Detect

DTR = Data Terminal Ready

DSR = Data Set Ready

NM = Null Modem

TD = Transmit Data

RD = Receive Data

SG = Signal Ground

PG = Protective Ground

I/O = Input / Output

TNC = Terminal Node Controller (or Packet Controller)

The first question we raise when we begin to partially understand data transfer is; "why can't we transmit data as it comes from the DTE direct"? Well, data in its RAW form has no real handshaking or speed limit. At the same time, it has no rhyme or reason as to where it is headed, and most significant to our packet system is the lack of any error-checking headers or protocol. Here is where we arrive at a need for the Packet controller / modem (DCE).

Our VHF transceivers are designed for an audio band-pass of approximately 300 to 3000 cycles (Hz). The packet controller in turn takes the raw data from the I/O device (DTE) and "refines" it into useable packets of information. Some of this information we never see, nor do we need to. Some of the refinements are the addition of the packet length, Speed, (Baud rate) Error-checking, and handshaking. This latter feature of the packet controller is a way of telling the DTE to; "hold the data-stream until I am ready for more".

The data entry system you are using to input data is a digitally based device. We cannot make our present day transceivers accept this digital data in the pulse form as it comes from the DTE, without some loss to the pulse shape, in turn; loss of data. Here is another big reason we need the packet controller / modem. It is here that the data pulse-train is filtered and reshaped from digital to analog signals and fed to the transceiver microphone input as an AFSK or PSK tone(s).

We are now beginning to see the true function of the packet controller. The ones and the zeros of the data stream from the DTE are converted to tones, or analog waveforms which resemble tones that lie within the 300 to 3000 cycle (Hz) band-pass of our transceivers. The reverse of this procedure is true for the incoming data as well. The DCE converts the analog signal from the radio into filtered, reshaped, error-checked, and displayed intelligence. Now that we understand the principle, let's connect the DTE to the DCE.

Defining RS-232

In the computer world there exists a communications standard. This "standard" is called RS-232 and the latest Electronics Industries Association (EIA) revision is "C". Thus we have RS-232C as the current version. To describe RS-

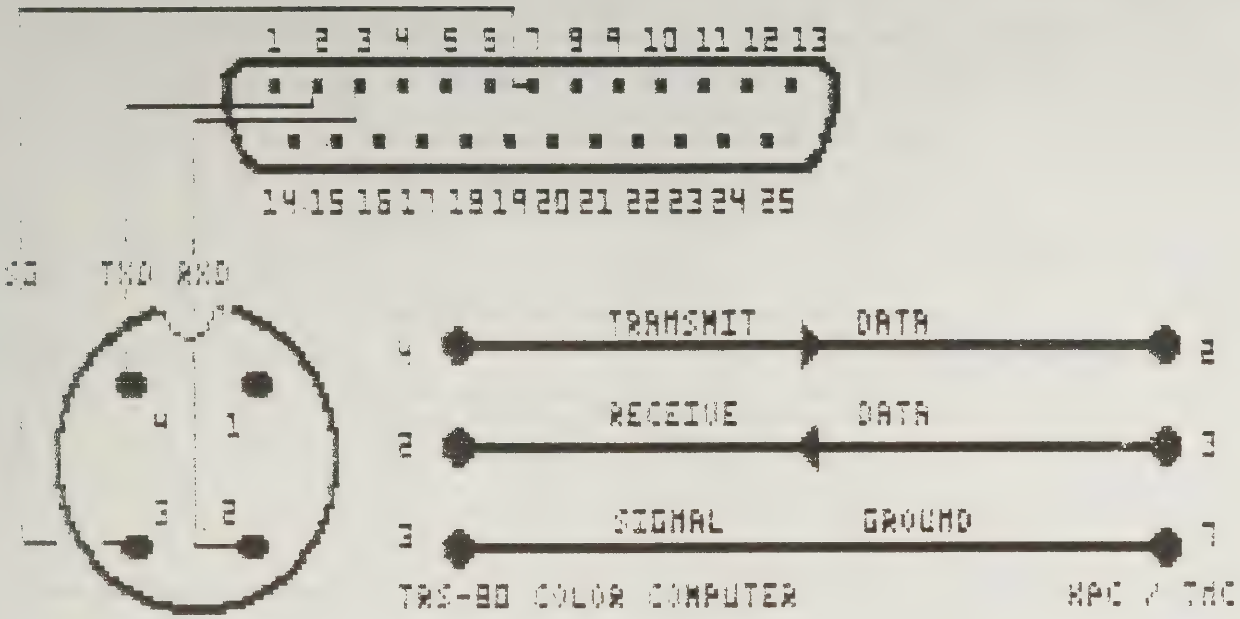

1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25
SG TXD RXD
4
1
3
2
TRANSMIT DATA
4
2
RECEIVE DATA
2
3
SIGNAL GROUND
3
7
TRS-80 COLOR COMPUTER
KPC / TNC

Figure 1. TRS-80 Color Computer to TNC/KPC BUCK4ABT

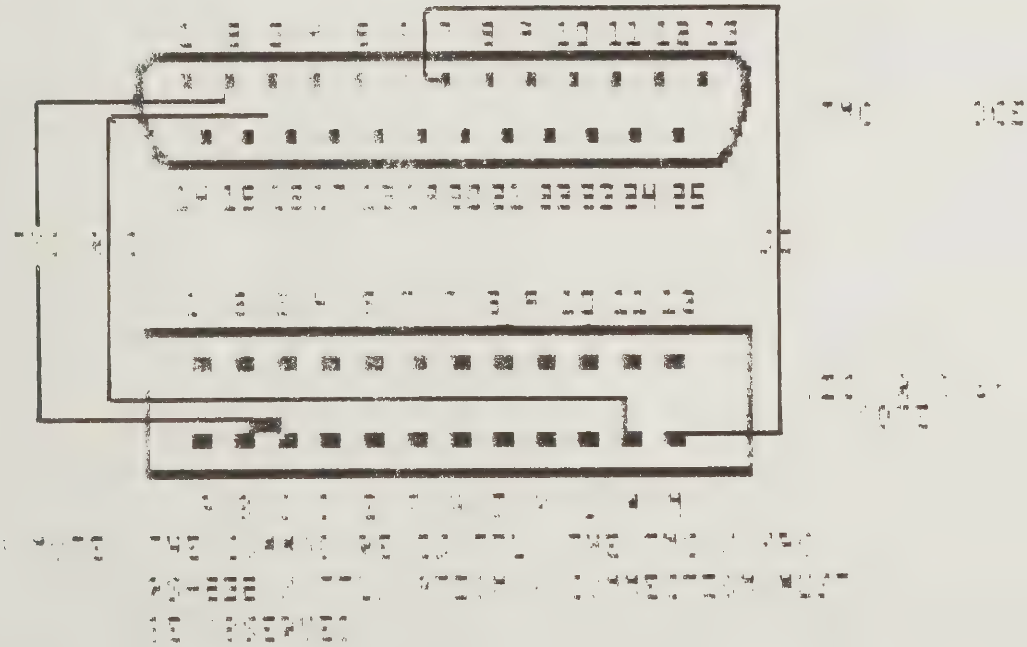
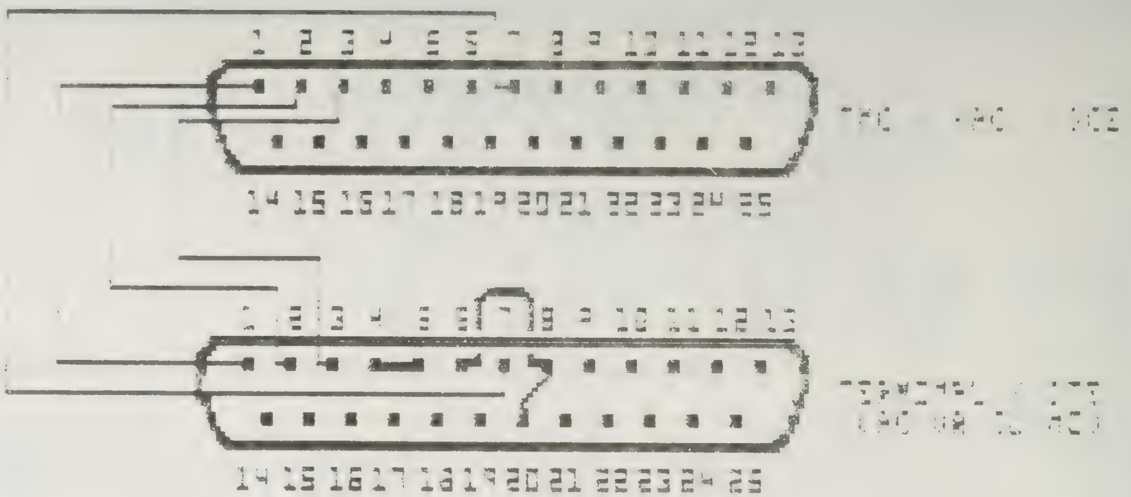
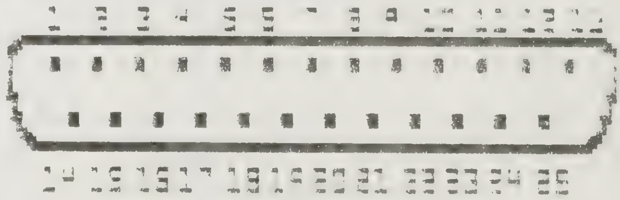

1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25
TNC DCE
TXD RXD
RS-232

Figure 2. C-64 and VIC Interfacing to TNC BUCK4ABT


1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25
TNC - PAC - DCE
1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25
TERMINAL / DTE
(PC OR CLONE)

NOTE: JUMPER PINS 6, 8, & 20
JUMPER PINS 4 & 5
TERMINAL END OF CABLE
(IF NECESSARY)

Figure 3 P C or Clone to TNC BUCK4ABT


1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25

1 GROUND
[illegible]

[illegible]

Figure 4. Typical RS-232C / DB-25 Connecotor BUCK4ABT

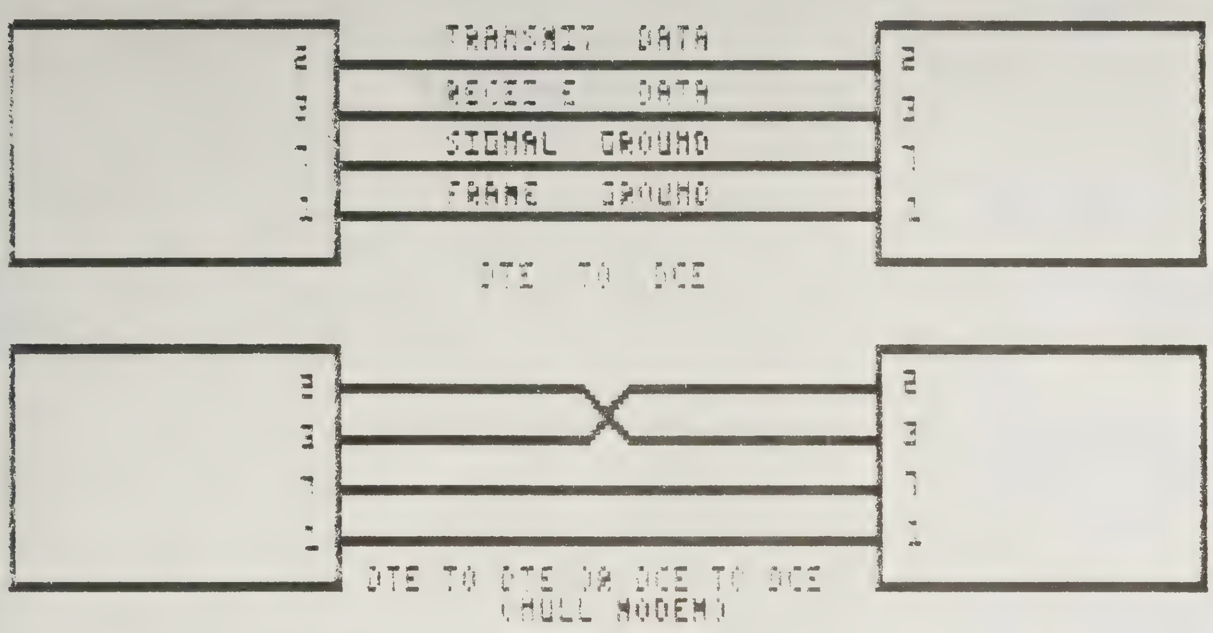

TRANSMIT DATA
RECEIVE DATA
SIGNAL GROUND
FRAME GROUND
2
3
7
1
DTE TO DCE
DTE TO DTE OR DCE TO DCE
(NULL MODEM)

Figure 5. **DTE to DCE** **BUCK4ABT**

232C, we say it in this manner; "Interfacing DTE to DCE employing serial, binary data exchange.

There is a "standard" connector that goes along with the RS-232C standard. It is sometimes (most of the time) calles; the DB 25 connector.

I am familiar with a few of the more popular computers and terminals. I will describe the interfacing to the TRS-80 Color Computer, (Fig. 1) the Commodore VIC & 64, (Fig. 2) and the PC or clones (Fig. 3). I hasten to add, the many other computers and terminals will interface in much the same manner.

Let's take a look at the DB 25 connector. (Fig. 4). It is easy enough to remember the name of this connector, because it has 25 pins. Of these 25 pins, there are 8 of the pins we are concerned with. In most applications, we will use only 3 of them.

The 8 pins are:

2 = Transmit Data
3 = Receive Date
4 = Request To Send
5 = Clear To Send
6 = Data Set Ready
7 = Signal Ground
8 = Data Carrier Detect
20 = Data Terminal Ready

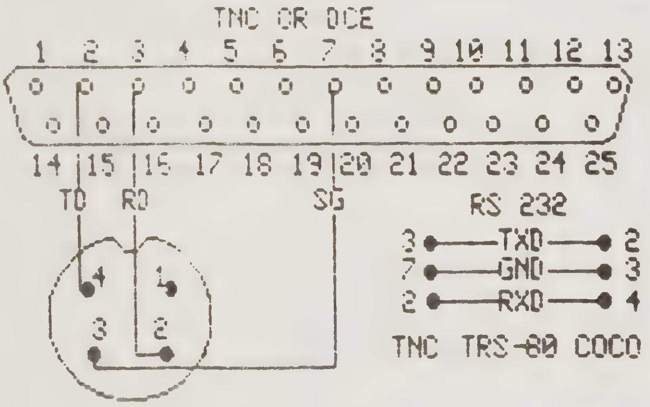

TNC OR DCE
1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25
TD
RD
SG
4
1
3
2
RS 232
3 TXD 2
7 GND 3
2 RXD 4
TNC TRS-80 COCO

FIG. 1

TNC/COCO
BUCK4ABT

Back Issues only
$3.50
postage paid

For 3 pin applications;

2 = TD
3 = RD
7 = SG

(note: in all my systems, I use pin "1" to preserve the integrity of the equipment ground)

Let's take a pin by pin tour of the pins we are working with.

Pin # 2 (TD) carries the serially transmitted data from the DTE to the DCE/TNC. (terminal to modem)

Pin # 3 (RD) carries the serially transmitted data from the DCE/TNC to the DTE. (modem to terminal)

Pin # 4 (RTS) tells the DCE/TNC that the terminal/DTE is ready to send data.

Pin # 5 (CTS), if "on" tells the terminal/DTE it may send data, while an "off" will tell it to stop sending.

Pin # 6 (DSR) indicates that the DCE/TNC is ready and available for use. In many controllers, this line is connected to pin 20 (DTR). This automatically leaves the controller ready for use. (Internal jumpers are normally provided to open this loop.)

Pin # 7 (SG) provides the reference ground to the AFSK, PTT, and receive AF circuits, (It will not provide "protective ground".)

Pin # 8 (DCD) is an output from some DCE/TNC to indicate the connect status of the TNC. (some RS-232 PAKS require that this pin be held high or "true" placing 5 volts DC on it.) Pin 8 is sometimes jumpered to pin 20 at the DTE end of the cable.

Pin # 20 (DTR) tells the DCE/TNC that the terminal/DTE is ready or available. Many TNC ignores the state of this line.

* Some DCE/TNC use pin 25 to carry **+12 volts** to the TNC from an external source. When the DCE/TNC provided power source is used, the internal +12 volts will appear on this pin.

As a precautionary measure, I recommend this pin **should NOT** be used and any wire conected to it, be cut...!

LET'S GET A BIT FANCY by utilizing a telephone modem in conjunction with our packet station. This will require 2 additional telephone modems. One at a remote location and the other at our packet station. This will also require a telephone or some other communications medium.

Set up the terminal/DTE and one of the telephone modems at the remote location with the second modem (in the answer mode and configured to match the TNC communications parameters) connected to the TNC via a "NULL MODEM" cable. i.e.; DCE to DCE or DTE to DTE cable. (see Fig. 5) Let's imagine the terminal is at our office and the (VHF) packet station is at home. We are at the office and we establish the link to the packet station, via the modems. The rest of the procedure is the same as when we are at the home station. (just hope we don't lose the modem link). It is comforting to know that Jean Ann (WB4EDZ) is there and has the 2 meter voice rig on.

I am including some of my transceiver to TNC interface schematics. I hope these will assist many of you who may have questions about "who is on first, or which pin to connect the PTT line to, etc..." I don't promise anything, however, we use these to put many of the area packeteers on the air. Good luck.

End of section one (1)

CONFIGURATION of the TNC is the next order of the session.

We all know there are close to 100 commands, and as many ways to use them. No one uses the same set for long, so I will not try to "plan your lunch" so to speak. I can tell you how I set my parameters and you take it from there. As you become more familiar with your own TNC/KPC/PAD etc... you are sure to refine the setup to suit your needs and transceiver requirements.

Please keep in mind that some of my parameters are set in this manner to accommodate my packet, high resolution color picture transfers. These configu-rations are for VHF packet.

As soon as I have the terminal talking to the TNC, I set "**MYcall** K4ABT", next comes the "**ECHO OFF**" (for the CoCo's and Commodores, prevents double letters) then set the **ABaud** and **PErm** it. I like to use an ABaud at least the same or greater than the **HBaud** of 1200. This allows the terminal buffer(s) to keep the TNC buffers clear and prevent "bottle-ncek" or TNC buffer overflow. A word of caution, for those who like to read the scrolling screen. It may be to your sanitys best interest to maintain ABaud at 1200. From this point we take the commands down the line.

AX25L2V2 on

AXD 10 (Allows the Receiver "AGC" to recover"

Beacon 0 (to reduce channel congestion)

CHeck 18 (allows 3 minutes without entry, then it disconnects)

Flow on (prevents received packets from coming in the middle of what I'm typing in)

HEaderline on (Places a carriage return between the header and the packet text.)

MAXUsers 2

Mon on (lets you see all packet while not connected)

MCon off (prevents other packets from interferring while in the connect mode)

MCOM on (shows information packet with each frame, i.e.,; <C>)

Tell them where you saw their AD!

MRpt on (shows the full path of each packet)

MYAlias on (allows the use of NAME or other LAN ID for digipeating purposes)

Paclean 128

RESPtime 12

DW 16 (both RESP and DW interact to provide collision protection, by allowing the "listen before transmit")

RETry 7

Ring on (rings the three connect bells.)

STReamsw 36 (will exhibit a hex 24, this is the $ dollar sign which I use to toggle between streams)

TXDelay 50 (gives the transmitter time to get to full power and lock of PLL, before the frame information is sent)

TXFlow on (sets the flow control on)

USers 2 (allows at least two connects to my stream"s")

XFlow on (enables Xon / Xoff handshaking)

I have listed only those settings which are beneficial to the packet newcomer.

Note: The Commodroe VIC and 64 are TTL controlled at the I/O data port and all strapping options or connections to the TNC should be made accordingly.

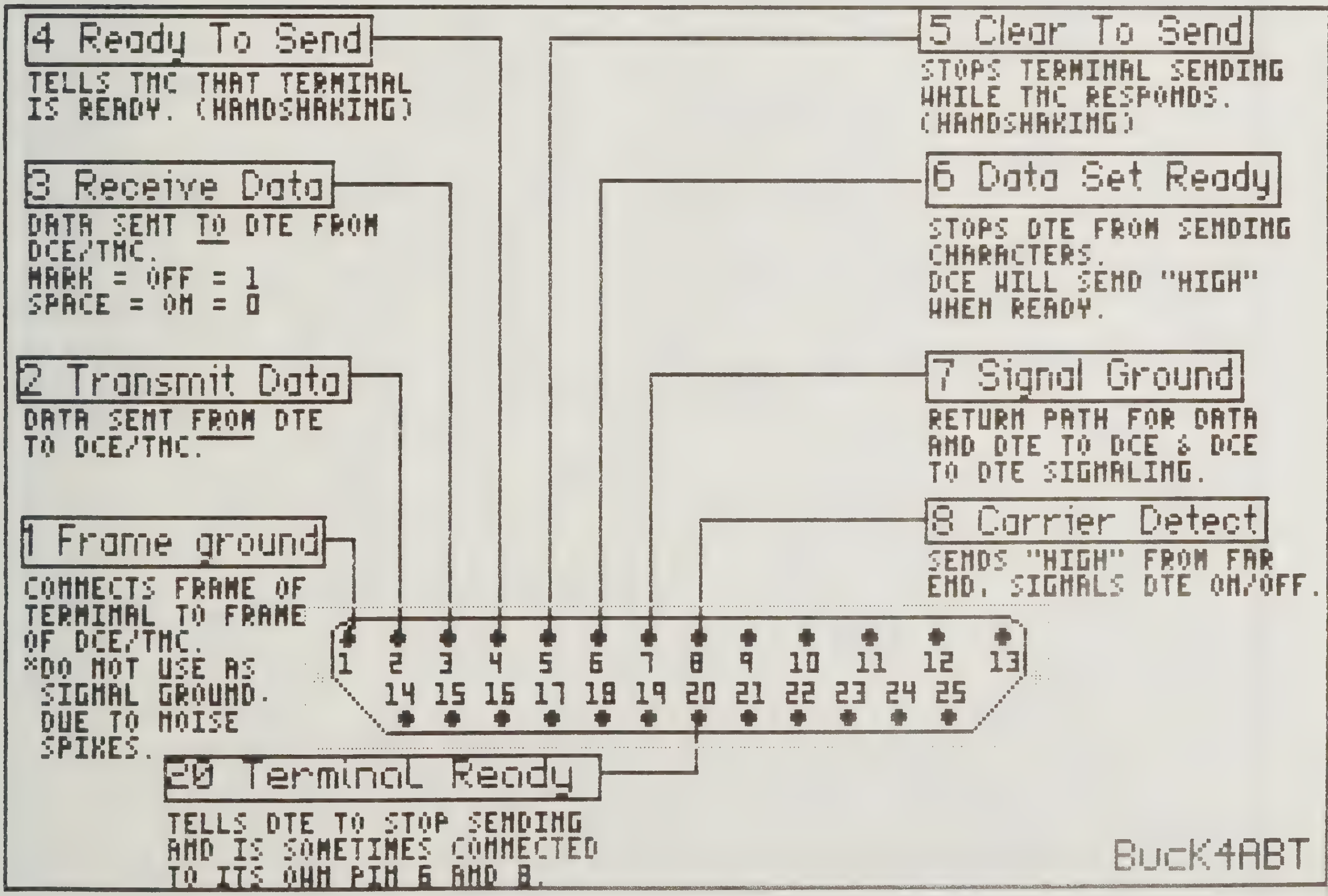
The TRS-80 Color Computer and the PC clones are standard RS-232 serial data streams.

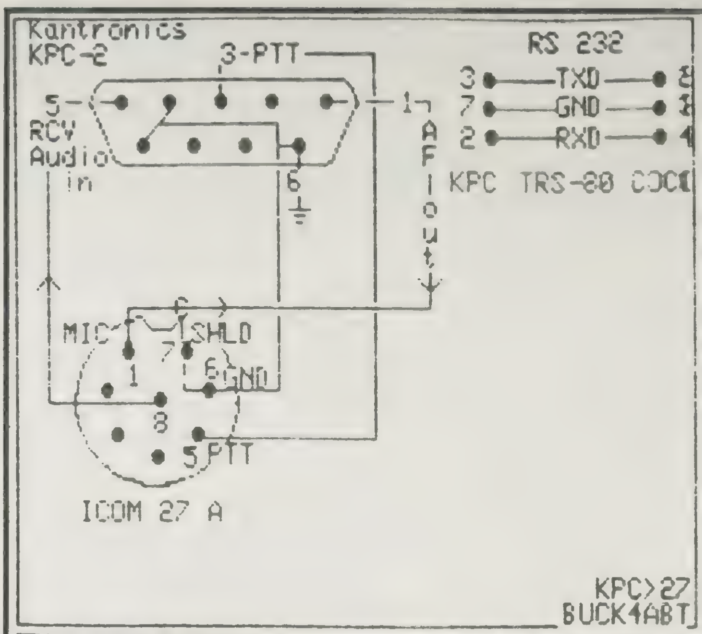
* TRS-80 and Color Computer are ™ of Tandy / Radio Shack Corp.

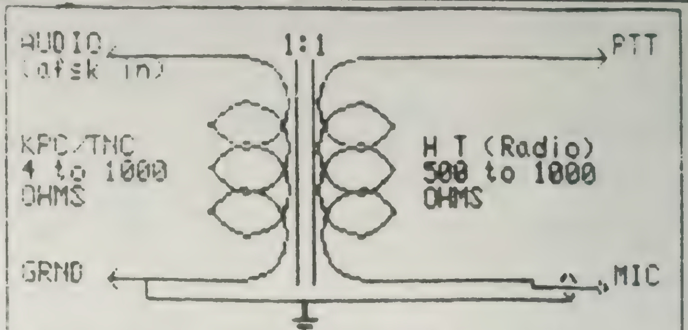
I hope this months column is of benefit to all the newcomers to packet and to the longtime user as well. So until next month;

73 de BucK4ABT
eof
CMD:D
Disconnected: <DM>
Unproto via CTM
506 Pheasant Ridge Drive
Warner Robins, Georgia 31088

CTM


4 Ready To Send
TELLS TNC THAT TERMINAL IS READY. (HANDSHAKING)
5 Clear To Send
STOPS TERMINAL SENDING WHILE TNC RESPONDS. (HANDSHAKING)
3 Receive Data
DATA SENT TO DTE FROM DCE/TNC.
MARK = OFF = 1
SPACE = ON = 0
6 Data Set Ready
STOPS DTE FROM SENDING CHARACTERS.
DCE WILL SEND "HIGH" WHEN READY.
2 Transmit Data
DATA SENT FROM DTE TO DCE/TNC.
7 Signal Ground
RETURN PATH FOR DATA AND DTE TO DCE & DCE TO DTE SIGNALING.
1 Frame ground
CONNECTS FRAME OF TERMINAL TO FRAME OF DCE/TNC.
*DO NOT USE AS SIGNAL GROUND. DUE TO NOISE SPIKES.
8 Carrier Detect
SENDS "HIGH" FROM FAR END. SIGNALS DTE ON/OFF.
1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25
20 Terminal Ready
TELLS DTE TO STOP SENDING AND IS SOMETIMES CONNECTED TO ITS OWN PIN 6 AND 8.
BucK4ABT

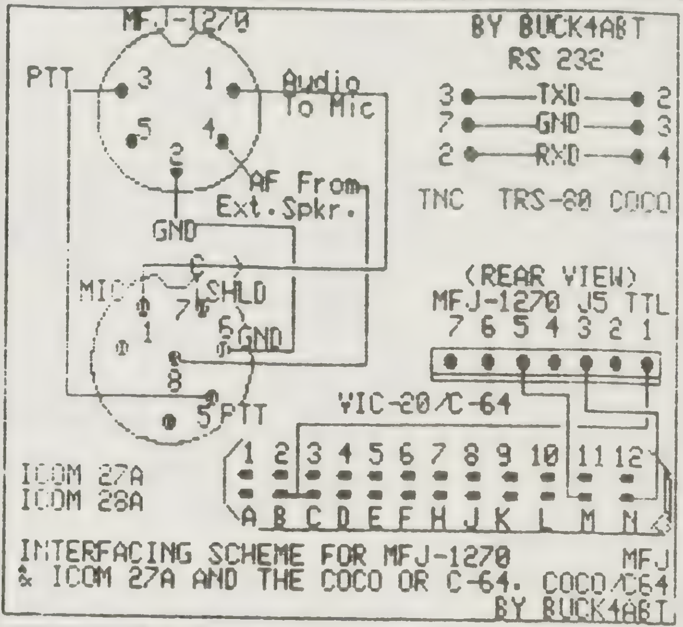

Kantronics
KPC-2
3-PTT
5-
RCV
Audio
in
6
1
A
F
out
RS 232
3 TXD 2
7 GND 3
2 RXD 4
KPC TRS-80 COCO
MIC
SHLD
7
1
6
GND
8
5 PTT
ICOM 27 A
KPC>27
BUCK4ABT


AUDIO
(afsk in)
1:1
PTT
KPC/TNC
4 to 1000
OHMS
H T (Radio)
500 to 1000
OHMS
GRND
MIC

Tiny 1:1 ratio txfmr. if possible. However, a transformer with an 8 ohm primary, and a 1k ohm secondary may be used. Be sure the lower impedance is connected to the KPC/TNC. The secondary should have an impedance of 500 to 1k ohm. "Mouser Electronics PN# 42TU500"

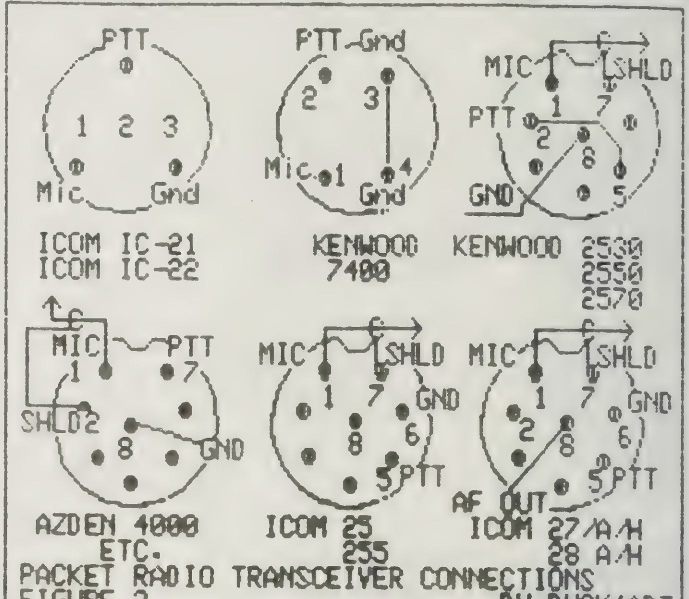
Circuit to connect TNC to handheld xcvr. ICOM, Kenwood, Yaesu, & others.

BUCK4ABT


MFJ-1270
BY BUCK4ABT
RS 232
PTT
3
1
Audio
To Mic
5
4
2
AF From
Ext. Spkr.
GND
3 TXD 2
7 GND 3
2 RXD 4
TNC TRS-80 COCO
(REAR VIEW)
MFJ-1270 J5 TTL
7 6 5 4 3 2 1
MIC
SHLD
7
1
6
GND
8
5 PTT
VIC-20/C-64
1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F H J K L M N
ICOM 27A
ICOM 28A
MFJ
COCO/C64

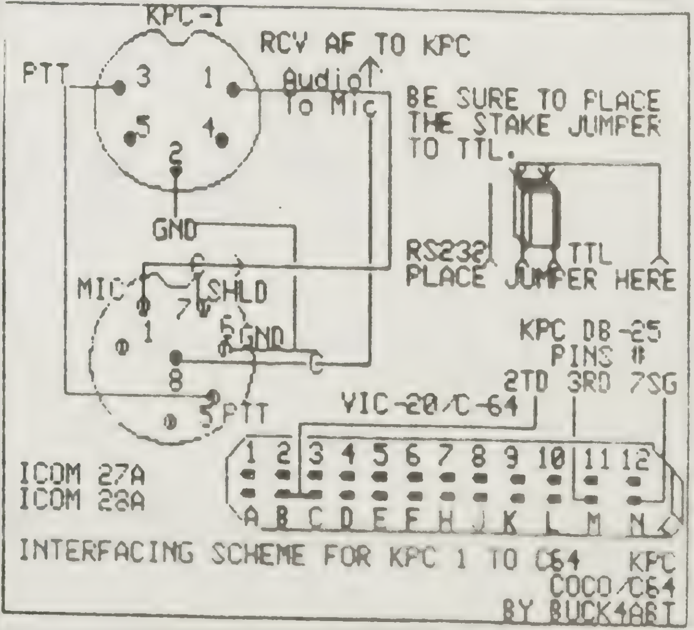
INTERFACING SCHEME FOR MFJ-1270 & ICOM 27A AND THE COCO OR C-64.

BY BUCK4ABT


PTT
1 2 3
Mic
Gnd
ICOM IC-21
ICOM IC-22
PTT-Gnd
2
3
Mic 1
4
Gnd
KENWOOD
7400
MIC
SHLD
PTT
1
7
2
8
GND
5
KENWOOD 2530
2550
2570
MIC
PTT
1
7
SHLD2
8
GND
AZDEN 4000
ETC.
MIC
SHLD
1
7
GND
8
6
5 PTT
ICOM 25
255
MIC
SHLD
1
7
GND
2
8
6
5 PTT
AF OUT
ICOM 27/A/H
28 A/H

PACKET RADIO TRANSCEIVER CONNECTIONS
FIGURE 2

BY BUCK4ABT


KPC-I
RCV AF TO KPC
PTT
3
1
Audio
To Mic
5
4
2
GND
RS232
TTL
MIC
SHLD
7
1
6
GND
8
5 PTT
KPC DB-25
PINS #
2TD 3RD 7SG
VIC-20/C-64
1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F H J K L M N
ICOM 27A
ICOM 28A
KPC
COCO/C64

BE SURE TO PLACE THE STAKE JUMPER TO TTL.

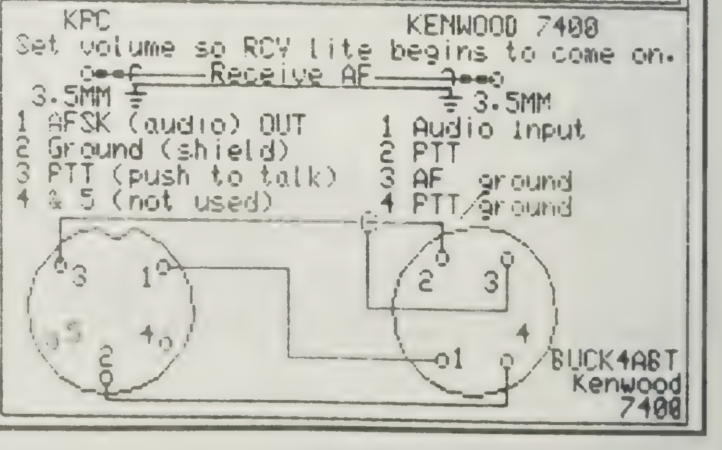
PLACE JUMPER HERE

INTERFACING SCHEME FOR KPC 1 TO C64

BY BUCK4ABT

BY BUCK4ABT

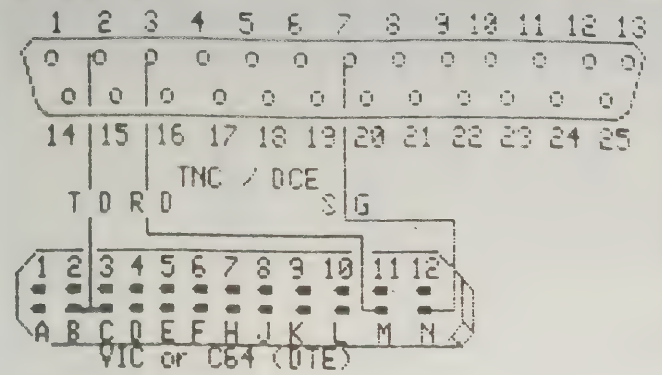
KPC	RS 232	CoCo
3	TXD	2
7	GND	3
2	RXD	4


KPC
KENWOOD 7400
Receive AF
3.5MM
3.5MM
3
1
5
4
2
2
3
4
1
BUCK4ABT
Kenwood
7400

Set volume so RCV lite begins to come on.

1 AFSK (audio) OUT
2 Ground (shield)
3 PTT (push to talk)
4 & 5 (not used)

1 Audio Input
2 PTT
3 AF ground
4 PTT/ground


1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25
TNC / DCE
T D R D
S G
1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F H J K L M N
VIC or C64 (DTE)

This computer must be configured for TTL. Most TNC's provide jumpers to allow this option.

Fig. 2

TNC>C64
BUCK4ABT

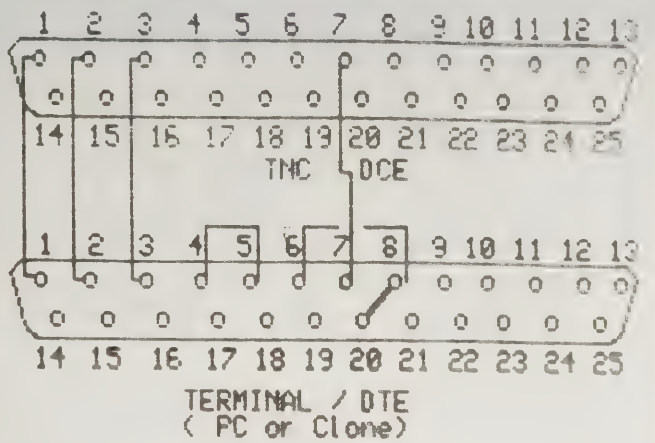
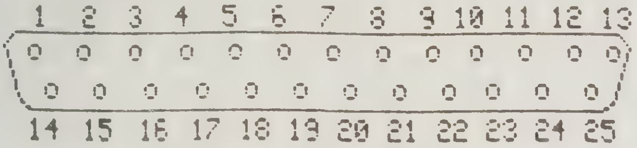

1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25
TNC DCE
1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25
TERMINAL / DTE
(PC or Clone)

FIG. 3

PC>TNC
BUCK4ABT


1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25

1	Ground	14	Secondary data (Tx)
2	Transmit Data	15	DCE (Tx)
3	Receive Data	16	Secondary data (Rx)
4	Request to send	17	Receive clock DCE
5	Clear to send	18	unassigned
6	Data set ready	19	Secondary RTS
7	Signal Ground	20	Data terminal ready
8	Carrier detect	21	Signal quality det.
9	Data set test	22	Ring indicator
10	Data set test	23	Data rate selector
11	unassigned	24	Transmit clock DTE
12	Secondary CD	25	unassigned
13	Secondary CTS		

FIG. 4 RS-232 FEMALE CONNECTOR

BUCK4ABT

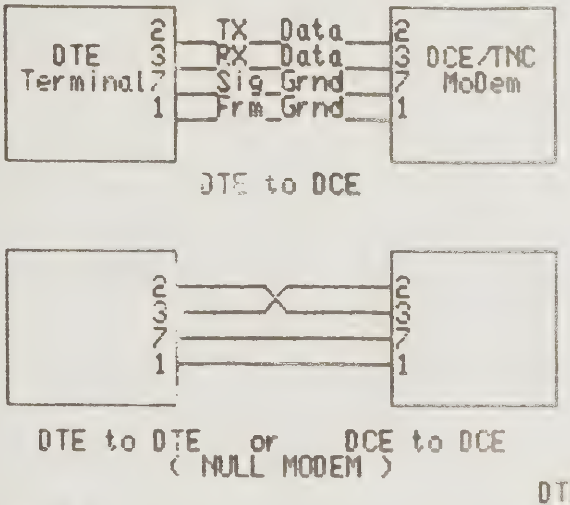
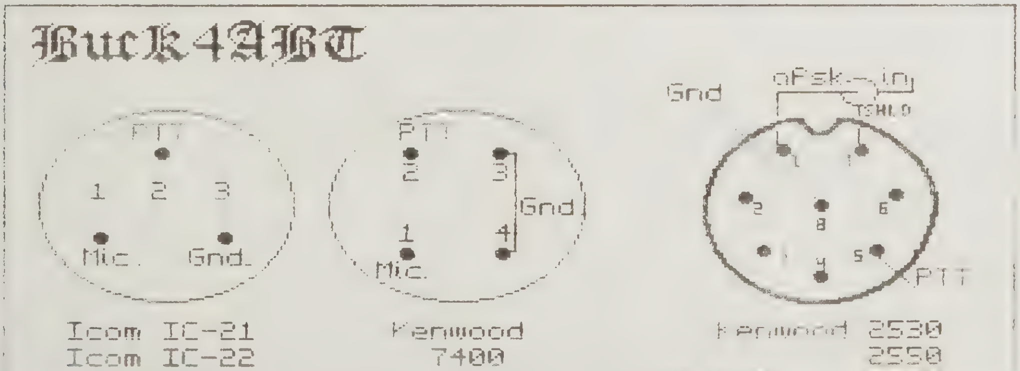
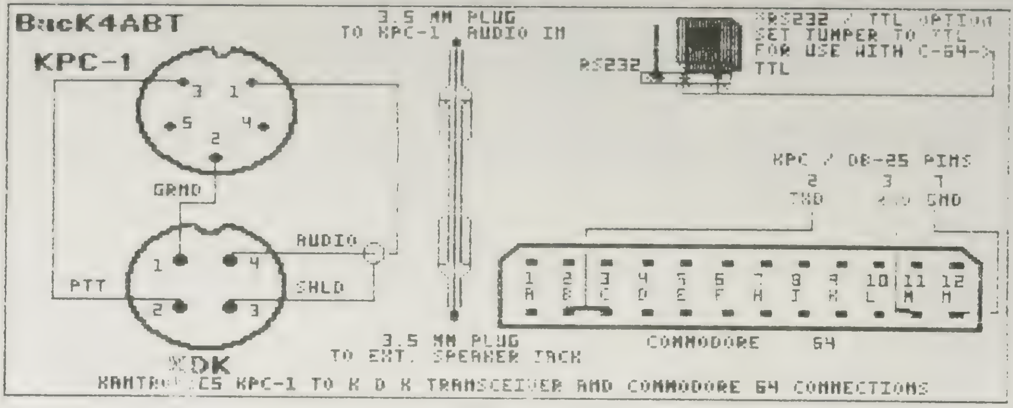

DTE
Terminal
2
3
7
1
TX Data
RX Data
Sig Grnd
Frm Grnd
2
3
7
1
DCE/TNC
MoDem
DTE to DCE
2
3
7
1
2
3
7
1
DTE to DTE or DCE to DCE
(NULL MODEM)

FIG. 5

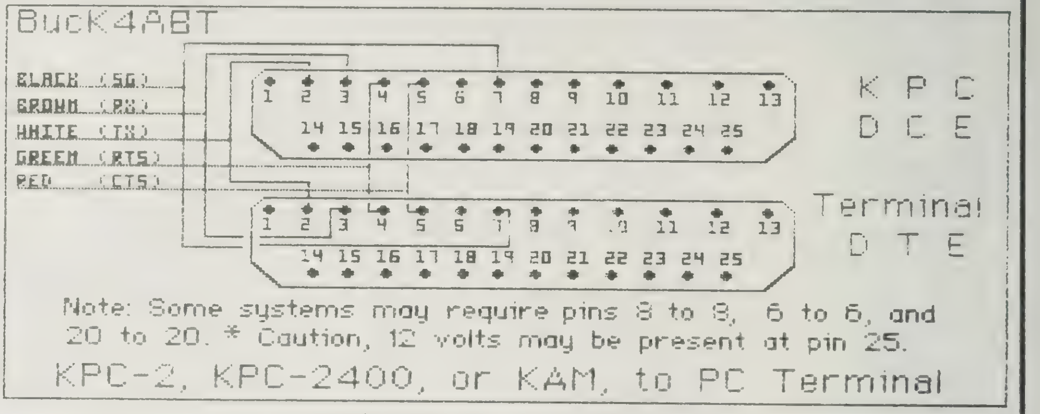
DTE
DTE


BucK4ABT
PTT
1 2 3
Mic.
Gnd.
PTT
2
3
Gnd
1
4
Mic.
Gnd
oPsk--in
TSHLD
1
1
2
8
6
4
5
PTT
Icom IC-21
Icom IC-22
Kenwood
7400
Kenwood 2530
2550
2570

Microphone connections For Pocket [illegible]

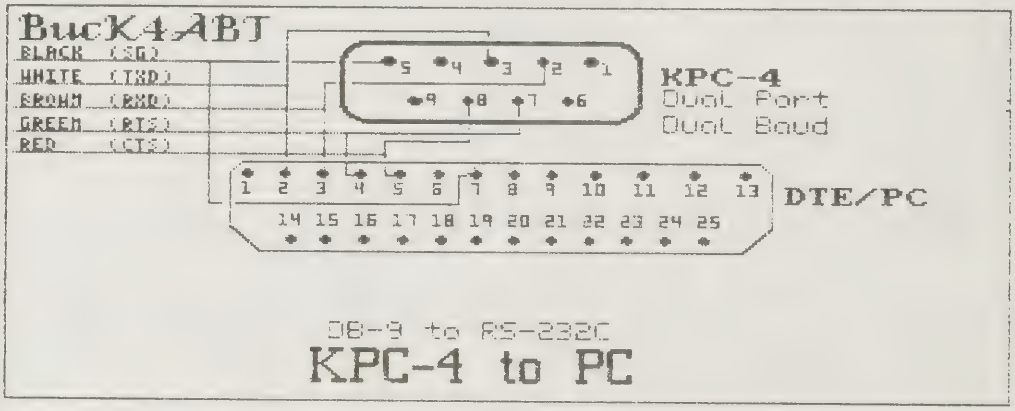

BucK4ABT
3.5 MM PLUG TO KPC-1 AUDIO IN
*RS232 / TTL OPTION SET JUMPER TO TTL FOR USE WITH C-64-> TTL
RS232
KPC-1
3 1 5 4 2
GRND
AUDIO
PTT
SHLD
1 4 2 3
KPC / DB-25 PINS
2 TXD
3
7 GND
1 A 2 B 3 C 4 D 5 E 6 F 7 H 8 J 9 K 10 L 11 M 12 N
COMMODORE 64
3.5 MM PLUG TO EXT. SPEAKER JACK
KDK

KANTRONICS KPC-1 TO K D K TRANSCEIVER AND COMMODORE 64 CONNECTIONS


BucK4ABT
BLACK (SG)
BROWN (RX)
WHITE (TX)
GREEN (RTS)
RED (CTS)
1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25
K P C
D C E
Terminal
D T E

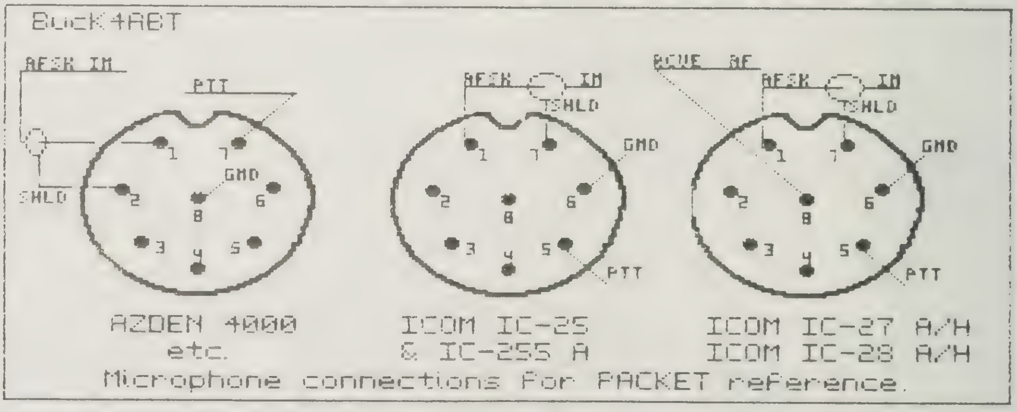
Note: Some systems may require pins 8 to 8, 6 to 6, and 20 to 20. * Caution, 12 volts may be present at pin 25.

KPC-2, KPC-2400, or KAM, to PC Terminal


BucK4ABT
BLACK (SG)
WHITE (TXD)
BROWN (RXD)
GREEN (RTS)
RED (CTS)
5 4 3 2 1
9 8 7 6
KPC-4
Dual Port
Dual Baud
1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25
DTE/PC

DB-9 to RS-232C

KPC-4 to PC


BucK4ABT
AFSK IN
PTT
SHLD
GND
1 7 2 8 6 3 4 5
AFSK IN
SHLD
GND
PTT
RCVE AF
AZDEN 4000 etc.
ICOM IC-25 & IC-255 A
ICOM IC-27 A/H
ICOM IC-28 A/H

Microphone connections for PACKET reference.

Thanks Buck for the fine diagrams on both the RS-232C connector and the various means of connecting various radios with the various TNCs. I'm sure the readers appreciate your hard work in bringing this hard-to-get information to them in a very concise method. You may have left out a rig or two but I can't seem to find it. Readers, I bet if you have a rig Buck omitted, write him and he will give you the necessary information. Thanks Buck! Chet...

Tell them where you saw their AD!

By Robert S. Hoover, KA6HZF

A C-64 for $20

Too Good To Be True?

My comment about finding some low-cost C-64`s has generated considerable mail as well as a few phone calls. Because of the high level of interest I thought it best to get the basic information to you as quickly as possible; later articles will have full details and illustrations.

The current catalog (#WS-87, orange & blue cover) from Fair Radio Sales (P.O. Box 1105, Lima, Ohio 45802, tel (419) 223-2196) lists junker VIC`s & E-64`s for very reasonable prices; the E-64 (catalog #MB-E64) is $19.95.

The E-64 is actually the CBM 4064, a 1981 C-64 motherboard *without* the sound chip (SID), video modulator, or color memory chip. The motherboard also lacks a power connector or switch, and doesn`t have a cabinet or keyboard. What you see is what you get -- a motherboard. Period.

I bought a pair of E-64`s from Fair Radio Sales and both were fully functional. They run all of the software I`ve tried -- they operate the AEA PK-64 Pakratt®, for example -- with the obvious limitations mentioned above. The lack of the sound chip means the connect alarm in the PK-64 doesn`t work, nor does the key-touch 'beep' in some of my word processing software. Since I`m not into games, lack of color was of no importance.

Monitor Required, Unless...

The lack of a video modulator means the unit can`t be used with a regular TV set. You can provide an outboard modulator, as with the VIC, or you can plug the unit directly into a video monitor, which is what I did. (A monitor gives you a sharper picture.) A commercial quality cable for direct monitor hook-up is available from Hosfelt Electronics, Inc. (2610 Sunset Blvd., Steubenville, Ohio 43952, tel. US (800) 524- 6464; Ohio (800) 334-6464) for $3.00 (catalog # COM-5).

If you`ve absolutely **got** to use a TV set, you`ll have to hay-wire up a video modulator... or use the one that comes with a VIC-20. Hosfelt offers a TI computer video modulator which might be re-wired to work with the E-64 (catalog # UM1381 at $4.75). I say **'might'** because I haven`t tried it -- you`re on your own. Ramsey Electronics (2575 Baird Road, Penfield, New York 14526, tel. (716) 586-3950) lists a video modulator **kit** (part number VD-1, $7.95) that operates on any voltage between 5 and 15 vdc. You`d have to make up cables and so forth, and once again -- I don`t know if the thing will work with the E-64.

Campbell Electronics (450 West Cody Road, San Dimas, California 91770, tel (714) 592-4611) offers a Jim Dandy 12vdc monitor for $25. It`s a 12" Panasonic, composite input, green-screen jobbie that lists for $15; the matching cabinet is $10. You need a couple of pots for brightness and contrast, plus you`ve got to do the wiring. Steve Sellers and I put one of these together in about 20 minutes one evening and I recommend it highly... with one note of caution: The bigger the screen, the more power it will use... and the harder it is to stuff in a back-pack. If you have to count every amp in your energy budget, you should look for one of the smaller monitors.

Mid-Tek Electronics (P.O. Box 489, Harlan, Indiana 46743, tel (219) 667-5680) and Quest Electronics (938 Bannock, Denver, Colorado 80204, tel (303) 623-7700) both offer 5" monitors from time to time. Prices vary and the best bet is to call around.

The Commodore requires a composite-input or 'one-line input' monitor. Often times you`ll see outstanding bargains in TTL (or '3-line input') monitors. No sweat. Both Mid-Tek and (Halted Specialties Company, 827 E. Evelyn Ave., Sunnyvale, CA 94086 (804) 732-1573 offer composite output to 3-line input converters at fair prices. (These are usually sold as a kit so get your iron hot.) The price of the composite to TTL converter often dilutes the bargain of the TTL monitor but, like patch cords and a decent VOM, it`s one of those things that is very handy to have around the shop.

Easy Conversion to 12v

Lack of the switcha power connector are not a problem if you operate from 12vdc. As a matter of course, I converted both rigs to 12vdc as soon as I received them.

Conversion to 12vdc was relatively straight-forward but only because I treated the unit as a communications device, **not** as a C-64. In my series on converting the stock C-64 to 12vdc I was facing an entirely different set of circumstances -- converting the C-64 to battery power without altering its ac performance. With the E-64 boards I had no such constraints. I clapped a husky heat-sink to one side of the rig and fed 12v directly to it, developing my 5vdc from a 7805 (TO - 3 pkg) screwed to the heat-sink. It was all very rough-&-ready but it is simple, inexpensive, and it **works**.

Cassette Unit = $10

The E-64 supports bothtape and disk -- it is exactly the same as the standard C-64 except in the cases mentioned above. I ordered a C-16 Datasette from F. Boufal (244 Fitzwater Street, Philadelphia, Pennsylvania 19147 tel. (215) 925-6469) for $9.95, removed the C-16 mini-DIN connector and replaced it with the regular VIC/C-64/C-128 card-edge connector. Operation of the Data-sette was normal in all respects.

Nowadays almost everyone uses disks but there are several compelling reasons to not only retain your Datasette but to include it in your planning for emergency communications. The main fault of cassette tape mass-storage -- its slow speed -- is also its main value in emergency traffic handling. The slow speed is a function of the redundant recording scheme used by Commodore, a virtually fool-proof system. Slower than molasses in January but dependable, too.

The second reason to retain the use of cassettes is the availability of media following a disaster. Assume the lights go out and you become the central traffic station for your community.Do you have enough **diskettes?** Chances are, you don`t. Moving traffic calls for a pool of about a hundred disks, at least three machines -- each with a disk drive -- and a solid, **practiced**, procedure for keyboarding batches of traffic, moving it to the communications station, maintaining files and so on.

Cassette tapes are tough, cheap and widely available. Disks may be high-tech and a little faster but when you`re playing hard-ball there`s no Second Place. Your emergency communication system must have adequate back-up and capacity. With disks the cost may force you to try and 'get by', which leaves you open for a sucker-punch when a real disaster strikes. If the high cost of diskettes and disk drives means your emergency station will not have adequate data-handling capacity, they by all means back up your system with cassettes. A full-featured but **slower** emergency communication station is a wiser choice than no station at all.

Keyboard = $3

The C-16 keyboard, available from a variety of sources including Radio Shack, Jameco, and Fair Radio (catalog # KB-C16 $3 if ordered with the E-64), will work with the E-64 after minor rewiring.

At first glance you might think the best bet is to simply rewire the connector -- it`s a 20-pin in-line type using insulation-displacement. But unless you have about four hands and a couple of spare connectors, working on the **other** end of the cable turns out to be a better idea. It`s a simple job -- takes about ten minutes. I`ll show you how in a follow-on article.

A Cardboard Cabinet?

The lack of a cabinet was a minor problem for me since both of the boards I bought will probably end up in applications where they won`t be connected to keyboards. To test the rigs I installed them in an old VIC chassis, a matter of five minutes or so. But what about folks who didn`t have an old VIC to play with? After fooling with the problem for a while I decided to see how tough it would be to make a C-64 cabinet from scratch. As it turned out, I ended up making three of them!

The first one was made from 1/8" plywood ("Doorskins" to you wood butchers) and some 3/8" square scrap for corner pieces. I did most my cutting on the bandsaw and whopped it together using a stapler and Weldwood 'Plastic Resin' water-mix glue. Not counting the time for the glue to dry, it took about two hours and after a couple of coats of varnish, came out looking like a mahogany box with a sloping front.

I was so easy I figured I must have done something wrong!

Then I decided to make a 'high-tech' cabinet using balsa, urethane foam and fiberglas. This took a lot longer but ended up looking almost exactly like a stock C-64 cabinet without the air vents. Painted it with two coats of two-part white epoxy. Shines like a new dime. Interestingly enough, it turned out heavier than the plywood cabinet due to my over-generous use of epoxy resin and fiberglas, but you could probably park a truck on it without fear of damage.

It was pretty clear that so long as the thing had enough strength to support the keyboard and was big enough to hold the motherboard, you could make a cabinet out of almost **anything**... and that got me thinking.

I made the third cabinet out of heavy poster-board, cut with a matt knife, held together with a wild assortment of duct-tape, gummed paper tape, epoxy, and what-have-you. I wouldn`t want the poor thing to sit out in the rain, but otherwise it worked just fine! The bottom line is that you shouldn`t be too worried about not having a cabinet. I`ll give you the basic dimensions of the plywood cabinet and show you how to put it together. It`s light and strong, and I doubt you`ll wear it out in your life-time unless you`re a termite.

But the best cabinet was the VIC. Took only a moment to install the E-64 motherboard and, since I`m not into games, I just bolted the 5v regulator to the side of the cabinet. Of course, if you wanted to operate from ac you could use the connector and switch from the VIC, but you`d have to do some additional work besides; I`ll mention this again in the article devoted to the specific subject.

If you`ve got an old VIC handy you should think pretty hard about upgrading to the E-64.

An Ideal Packet Terminal

With its 40 column display, 64k of memory, and continuing software support, the C-64 is a much more powerful computer than the VIC; more useful and more practical. It makes a better Packet terminal, for example, and is supported by a number of word processing packages which can be used to enter emergency message traffic. There are also a number of applications in which a keyboard and monitor are not necessary, as a mini-BBS for example. I've already began work to dedicate at least one of the boards to that application. Would a fully portable, frequency-agile BBS system be handy for emergency communications? I think it would and I`m going to try and assemble such a system in as small a package as possible.

A Bargain? Perhaps.

We seldom get more than we pay for, most times we get a lot less. The $20 price tag on the E-64 in no way represents the total cost nor the real worth of this machine. By the time you figure in the keyboard, monitor, power supply and cassette unit the price has more than doubled. The value of this machine is also difficult to pin down because it depends on what the machine will be used for. If you just want to play games you`d be better off with something else.

Returning an E-64 to service isn`t a beginner`s project but it isn`t all that difficult, either. If your situation is similar to mine, where you have time to work on something but little cash, converting the E-64 is probably a good choice.

From the time I ordered the two E-64 boards from Fair Radio Sales I began keeping a set of notes; if they worked out -- as they have -- the notes would be the basis of articles showing how to convert the units, construct cabinets for them, rewire the C-16 keyboards, and so on. The E-64 turned out to be a good buy for me and I think you will be able to use it too. The notes are now being turned into illustrated articles but as you know, I`ve several other projects already underway so it will be some time before the information will appear in **CTM**, *by which time the supply of E-64`s may be sold out*. Anyone interested in obtaining a low-cost C-64 should consider acquiring the motherboard **now**. With any luck, the articles I mentioned above -- with illustrations -- should begin appearing in **CTM** sometime this fall.

Can You Do Chet A Favor?

Most of the outfits I`ve mentioned in this article don`t advertise in **CTM**. It would be a friendly gesture toward Chet if when you contact these people you pointed out you heard about them from an article in **CTM**. One of the realities of life that Chet has to face every day is the need for *advertisers;* they`re the grease that keep the wheels turning and it doesn`t hurt to remember the old saw: All four wheels on a wagon share the load but only the *squeaking* one gets the grease.

Now Can You Do Me A Favor?

If you`ve enjoyed some of the stuff I`ve written, I`d like to trade on that and ask someone out there to do me a favor. I want to give a battery-powered E-64 to Jim Hale, the feller up there in the Ozarks who keeps his eye on the satellites for us. The Russians now have a booster that can loft a 100 ton payload and they`ve shown they aren`t shy about gaining the high ground of space. I don`t look for Reds under the bed before I go to sleep but only a damned fool would ignore the fact they can now throw more weight than we can.

I`d sort of like to keep an eye on them, something Jim is already trained and willing to do. I think what he`s doing is important and deserves not only our recognition but our support, too. Jim only has battery power at his place but it strikes me he`s the sort of guy who will get the most out of what he`s got; if he had a C-64 the chances are pretty fair he`d not only make good use of it, we`d all get some benefit from what he does with it.

So here`s the favor: If someone will buy an E-64, keyboard, and datasette, I`ll convert it, put it in some kind of cabinet, and make sure Jim gets it. But don`t go confusing this with charity, this is priming the pump: You do me a favor, I do Jim a favor (except he hasn`t asked), and we all get something from it.

(Reading back over this it strikes me that I`ve never seen this sort of thing in any of the other radio/computer magazines -- at least not in the last thirty years. Has helping each other gone out of style?)

Robert S. Hoover, KA6HZF
1875 Monte Vista Drive
Vista, California 92084 **CTM**

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By Michael Bryce, WB8VGE

The Battery Topper

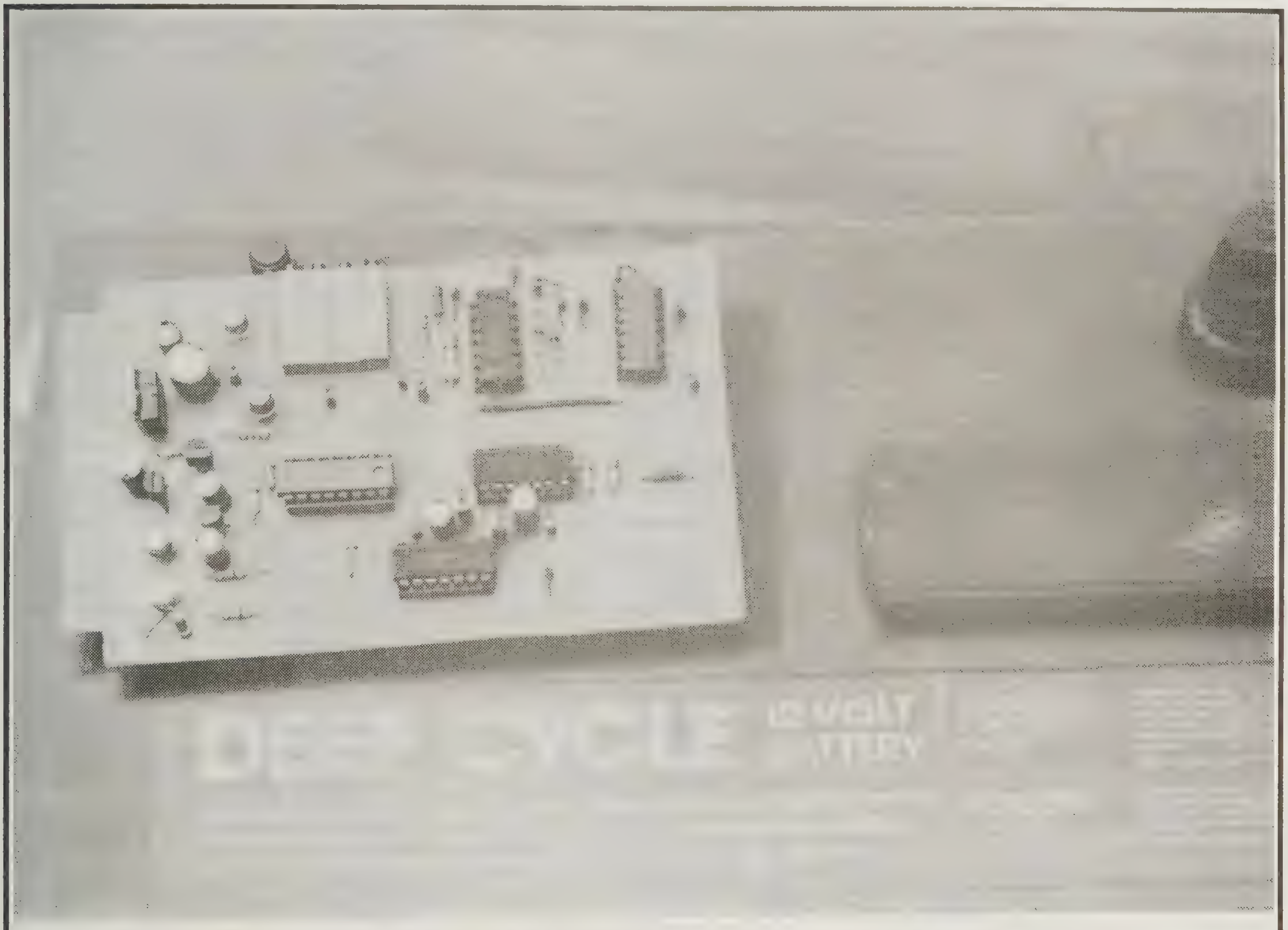


Photo of Battery Topper built on a PC board that measured only 3 X 5 inches. Note the 4 trimmer pots on the top side of the board.

No on knows when disaster will strike. But when it does, emergency communications can save lives and property. Such communications may consist of HF radio, 2 meter FM or even Packet high speed data stations.

However, no matter what the type of fancy gear one may have, the need for some type of battery operation is a must. It may not be practical to steal the battery from the automobile; the automobile may be needed or may have been destroyed. A full time battery back-up supply is called for.

Bob Hoover's recent article (**CTM** March 1987) on using old car batteries is **MUST** reading before getting too far along.

Perhaps the biggest problem is

keeping the battery topped-up and ready for use at any given time. Remember, disasters don't send a warning letter to the ARES director before hand. Just when you need them the most, they will be dead as a doornail.

Here's a small weekend project to help ease your mind from worrying about the state of charge of your stations's emergency batteries. I call it the **"Battery Topper"**. It will constantly look at the battery terminal voltage and determine if the batteries need to be charged. There is no muss or fuss in its operation. This article describes the control circuit. A department store battery charger does all the work. The controller will tell the station operator if the battery is getting low, both by an audio and a visual warning system.

Construction can be on either PC board or on Perf-Board using wire wrap. The controller does use CMOS devices, so be careful of static charges when building the device.

The use of CMOS devices allows for a very small stand-by current. The input voltage and all control voltages are regulated, thanks to the on-board chips. The relay-driver transistor will handle up to one amp of current so almost any number of junk box, 12 volt relays may be used. While I try to design all my projects so adjustments require no special test gear, a digital voltmeter will be needed for proper set-up of the comparators.

Figure 1. shows the topper's schematic. There are four comparators inside the LM339. Each comparator's input is connected to a voltage divider (R1-R4, each a 20K Ohm, 10-ten trimmer). These are used to set the voltages needed for proper operation. R1 sets the **"off voltage,"** while R2 sets the **"on" voltage.** Also note that the inputs to the trimmers are not connected to the same spot as the power input to operate the circuit. This is done so the most accurate reading is available to the comparators. Just a few millivolts drop will cause an error.

How it works

The circuit works as follows: comparators A and B, sense the battery voltage and switch states. The output of both comparators is connected to one NAND gate, which is then used to SET the Reset/Set (R/S) latch. Think of the R/S latch as a type of latching relay. When the "set" input goes low, the latch is "set". It will then ignore all other inputs on the set pin. To reset the latch, a low must then be applied to the "reset" pin. When The latch is set, the Q1 output then goes high and turns on the transistor switch, allowing the relaya to become energized. This turns on the cahrger and will, in turn, charge the batteries.

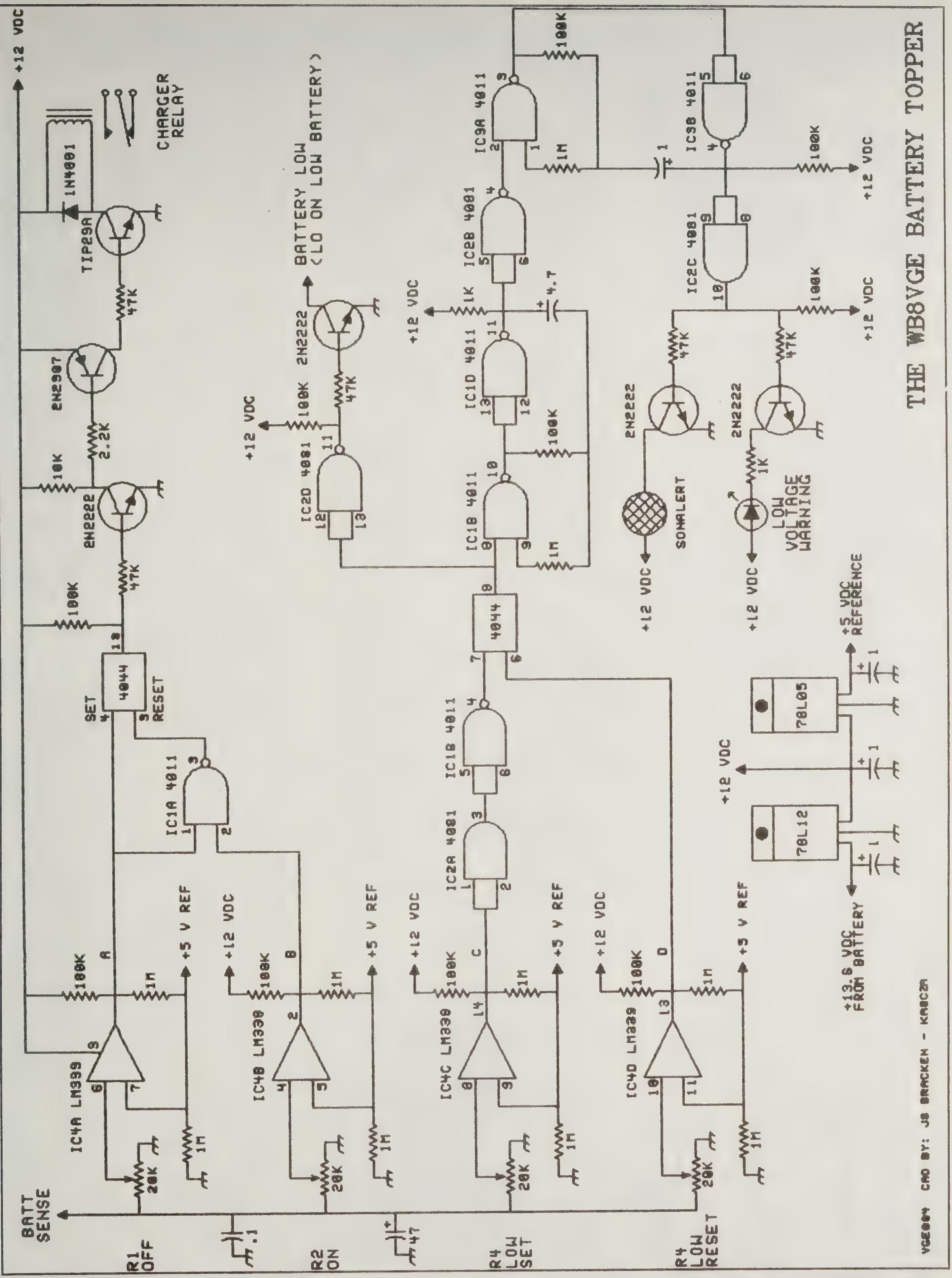
If we start with a fully charged battery, this is how it works: The output of both comparators will be low; when the battery voltage starts to drop past the "off" set point, the output of the comparator goes high. This places a high on pin 4 of the R/S latch and pin 1 of the NAND gate, IC1a. Since the battery voltage is still within the "window" nothing will happen. If the voltage drops out of the window, then the second comparator will go high. This high is applied to pin 1 of IC 1a. Two high inputs will force the output of IC 1a to a low state, causing the R/S to latch. The output of the R/S latch then turns on the transistor switching, and the battery starts to charge. Now that the battery is charging, the terminal voltage will rise. When it comes up to the ON voltage, the comparator will go back to a low state. When the battery voltages get to the OFF set point, the comparator will go low, resetting the latch and turning off the relay and charger.

The two remaining comparators are used to set the **"low battery warning."** They work the same way as the first two. The output of comparator C needed some extra gates to invert the output and to buffer it from the R/S latch. The **"low set"** will turn on when the battery is just about completely dead. Once it is set, then the battery voltage must rise up to **"reset"** the low warning. This was needed so the warning would not sing along in step with a fluctuating (i.e., CW or SSB) load. Pin 9 of the R/S latch turns on a gated oscillator, which then gates on a second oscillator. This in turn operates the transistor switching and allows for the low voltage warning. The output here is both an LED and a sonalert. With the two oscillators running, the output is rather interesting.

As a second thought, I connected a remaining gate to act as an open collector switch. The output will go to ground when the battery is low and will not follow the gated oscillator in the warning system. You may use the open collector output for whatever you like. *Repeater owners should take note.* By using the topper's circuits, a low battery warning could be sent out over the repeater transmit audio. The control operator could then turn the PA amplifier to low power of shut down the repeater. Make sure you don't exceed the current requirement for the transistor collector.

Set-up requires a digital voltmeter to adjust the comparators. While it is possible to set the comparators with an analog meter, it makes for a more accurate project to use a digital meter. The first thing that has to be done is to determine the set points. These will be different in most cases. They will depend on the type of battery and the size of the charger you have. You may want to start with the set points that I use here. In addition to the meter, you will need a variable power supply and a VOM (Voltage Ohm Meter) or logic probe.

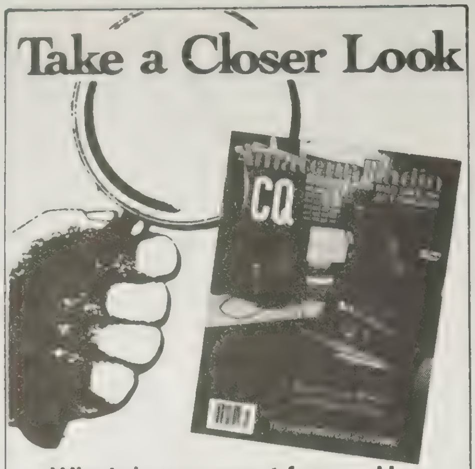
For the time being, connect both the sense wires and the supply wires together. Moving on the comparators, turn on the power supply and set it (with the help of the digital voltmeter) to 14.8 volts. Connect the VOM or logic probe to pin 1 of IC 4a and adjust R1 until the voltage of pin 1 changes from high to low. Drop the voltage to 12.0 volts and run the voltage back up to 14.8 volts. Make adjustments to R1 to get the comparator to



THE WB8VGE BATTERY TOPPER

+12 VDC
CHARGER RELAY
1N4001
TIP29A
47K
2N2907
2.2K
10K
2N2222
100K
4044
SET 4
RESET 3
13
IC1A 4011
IC4A LM339
IC4B LM339
IC4C LM339
IC4D LM339
A
B
C
D
1M
+5 V REF
20K
BATT SENSE
.1
47
R1 OFF
R2 ON
R4 LOW SET
R4 LOW RESET
BATTERY LOW (LO ON LOW BATTERY)
IC2D 4081
IC2A 4081
IC1B 4011
IC1D 4011
IC2B 4081
IC3A 4011
IC3B 4011
IC2C 4081
1K
4.7
SONALERT
LOW VOLTAGE WARNING
78L05
78L12
+5 VDC REFERENCE
+13.6 VDC FROM BATTERY
VGE004 CAD BY: JS BRACKEN - KA8CZA

Take a Closer Look



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switch at exactly 14.8 volts. There will be a very distinct switch from high to low at the output switching points. Move the logic probe to pin 2 of IC 4a and repeat the above procedure, this time using the turn on voltage of 12.3 volts. When that is done, a relay connected to the outpout will close when the voltage is down to 12.3 and remain on till the power supply is adjusted up to the turn off point of 14.8 volts. The other two comparators are set for 11.7 volts for low warning and 12.3 volts for low warning reset.

When all the comparators have been set, increase the supply voltage to 14.8 and watch what happens when you slowly reduce the voltage to the controller. When you reach 12.3 volts the relay will pull in. Drop the voltage some more. At 11.7 volts, the low battery LED will begin to flash and the audio warning will start to beep. Now increase the voltage. At 12.3 volts the LED will go dark and the audio will stop: At 14.8 volts the relay will de-engerize.

Final work

All you have to do now is place the controller inside a suitable box and connect up the charger to the 110 volt AC supply. Also be sure you run two wires to the battery; one for the supply and the other for the battery sense. Don't cheat here, or you may have trouble later.

The battery charge will play a big role in the final operation. Get one that is big enough to charge the battery(ies) you have. You could also build your own charger from parts from the junk box.

Possible problems

There may be someone who will have trouble with the set points. This always comes down to the size of the batteries and the size of the charge. Common troubles include not staying on long enough to charge the battery all the way, over charging, or the controller "cycling" on and off. Remember these things. First, a 12 volt battery *is not* 13.8 volts when fully charged, *but* 12.6 volts. We have to put back more juice than we take out, so the voltage must be higher (14.8). Test the battery with a hydrometer. If the specific gravity is 1.280 (check the specs of your battery's specific gravity) then the battery is fully charged. If the controller shuts off before that point is reached, then increase the turn-off voltage. Likewise, if the battery's specific gravity is reached before the controller shuts down, then reduce the off set-point. If the controller cycles, then the **"window"** is too tight. Move one or the other set points. You shouldn't have them too close to each other, because of the loading effect of the radio gear on the battery. If I had to move one, it would be the **"on"** set point.

With a 105 amp hour deep cycle battery, you will need about a 6-amp charger. A smaller one will do, but it will take longer to do the job. Also the set point will have to lower as the battery terminal voltage will not rise as much. On the other hand, don't get a 50-amp charger either. It will cause the voltage to raise too fast and not get the battery fully charged before the controller shuts down the charger. No matter how you do it, experimenting will be required.

That's it. This little circuit will keep those batteries topped up and ready for emergency communications or for just plain rag chewing. Every ham radio station should have some means of getting on line in the event of a power outage. Here is the first step.

My thanks to Stew Bracken, who did my schematic for the **Battery Topper.** Stew will be doing all of my schematics in the future.

Michael Bryce, WB8VGE
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Massillon, Ohio 44646 **CTM**

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By W. Fred Locke, KA5CMM

Printer Setup

For the Tandy DMP 130

The purpose of this routine is to allow the user to SET UP some of the many modes of operation on the Tandy DMP 130 printer. I currently have this routine running on a Tandy 1000, but could also run on many of the Tandy 1000 Clones. The ideas of this routine could be made to work on almost any Computer/printer pair.

This routine is menu driven, and simple to operate. A look at Figure 1 will show the PRESET main menu. It contains two sections: the menu section and the status section. The menu section doesn't change throughout the execution of the routine. The status section uses rotary sub-menus to describe the current mode(s) selected.

Program Description

This routine is divided into three sections. The first displays the main menu. The second is the execution loop. And the third is the subroutines needed to perform the required operations.

The first section shows eight main categories of printer modes.

Item 1 resets the printer to the default setup selection. You may modify this default mode to meet your needs. It is executed when this routine is first entered or when selected from the menu.

Item 2 tells the printer to select the desired character set.

Item 3 selects the style of print, such as; Normal, Compressed, Condensed, Near Letter Quality (NLQ), NLQ Compressed, NLQ Proportional Spacing, or Micro-Font. Each of the above items use a rotary menu to make the desired selection.

Items 4,5,6 and 7 are OFF/ON selections and are self-explanatory.

Item 8 uses a rotary menu to select Superscript, Subscript, or OFF.

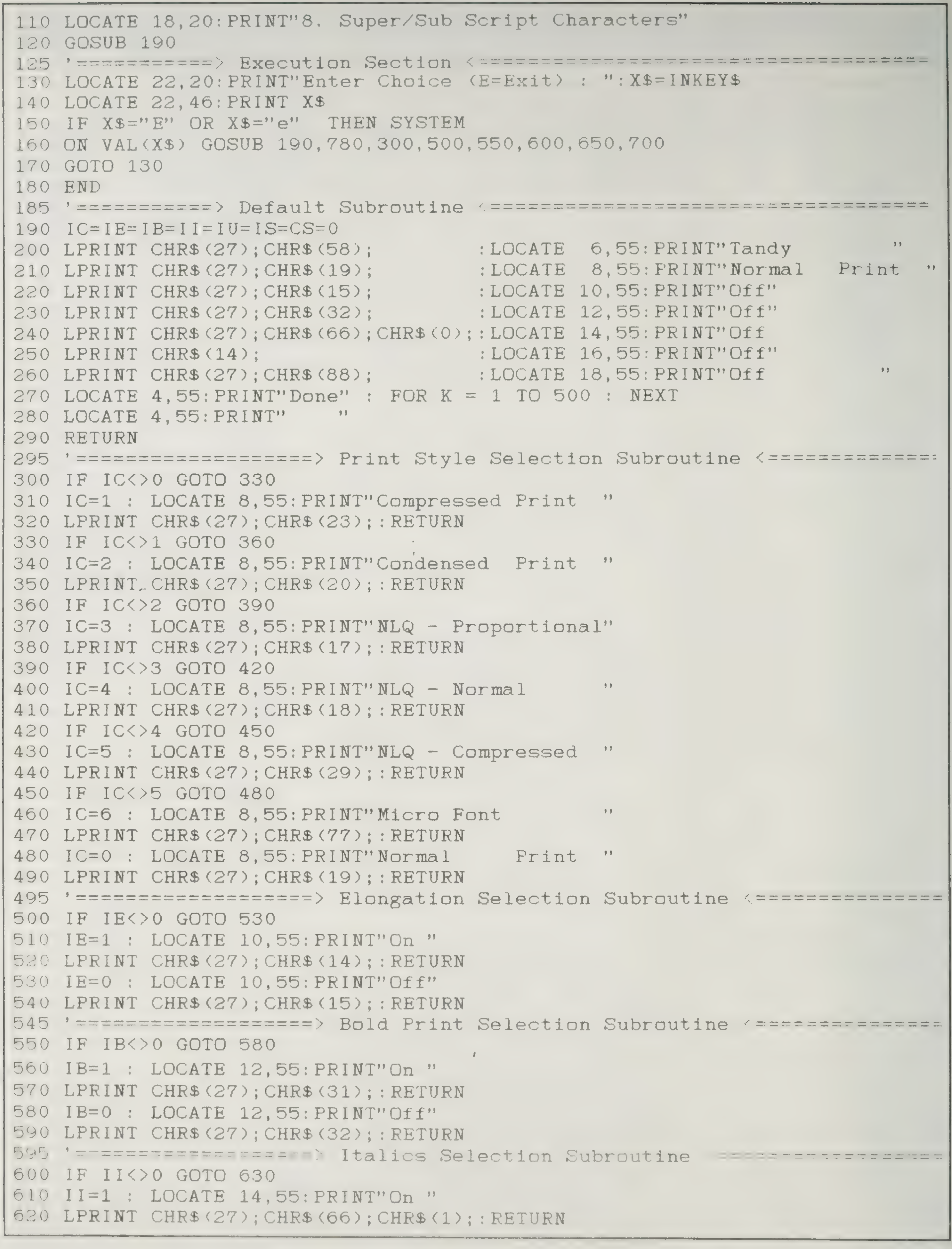
Section 2 is the execution section. This section is a simple loop with a Computed GOSUB in it. The Computed GOSUB calls the 8 subroutines in the next section.

This Section contains the 8 different subroutines that do the work of sending commands to the printer and updating the Menu page. The printer commands were taken from the printer book, so other printers could be substituted with the proper mode code changes.

This routine could be compiled, but I have found that the speed of this routine is sufficient for my needs. One plus to a compiled version would be less load time.

```
1. Reset to Normal Printer
   Mode
2. Character Set Tandy
3. Character Style
NLQ - Compressed
4. Elongated Characters Off
5. Bold Characters  Off
6. Italic Characters Off
7. Underlined Characters Off
8. Super/Sub Script Characters
   Off
Enter Choice (E=Exit)  ; 3
```

```
10   ============> Printer Setup Menu <==================================
20   KEY OFF:COLOR 0,14,0 :CLS
30   LOCATE  2,20:PRINT"   Printer Set-up Menu"
40   LOCATE  4,20:PRINT"1. Reset to Normal Printer Mode"
50   LOCATE  6,20:PRINT"2. Character Set"
60   LOCATE  8,20:PRINT"3. Character Style"
70   LOCATE 10,20:PRINT"4. Elongated Characters"
80   LOCATE 12,20:PRINT"5. Bold Characters"
90   LOCATE 14,20:PRINT"6. Italic Characters"
100  LOCATE 16,20:PRINT"7. Underlined Characters"
```



```
110 LOCATE 18,20:PRINT"8. Super/Sub Script Characters"
120 GOSUB 190
125 '===========> Execution Section <=====================================
130 LOCATE 22,20:PRINT"Enter Choice (E=Exit) : ":X$=INKEY$
140 LOCATE 22,46:PRINT X$
150 IF X$="E" OR X$="e"  THEN SYSTEM
160 ON VAL(X$) GOSUB 190,780,300,500,550,600,650,700
170 GOTO 130
180 END
185 '============> Default Subroutine <===================================
190 IC=IE=IB=II=IU=IS=CS=0
200 LPRINT CHR$(27);CHR$(58);        :LOCATE  6,55:PRINT"Tandy        "
210 LPRINT CHR$(27);CHR$(19);        :LOCATE  8,55:PRINT"Normal   Print  "
220 LPRINT CHR$(27);CHR$(15);        :LOCATE 10,55:PRINT"Off"
230 LPRINT CHR$(27);CHR$(32);        :LOCATE 12,55:PRINT"Off"
240 LPRINT CHR$(27);CHR$(66);CHR$(0);:LOCATE 14,55:PRINT"Off
250 LPRINT CHR$(14);                 :LOCATE 16,55:PRINT"Off"
260 LPRINT CHR$(27);CHR$(88);        :LOCATE 18,55:PRINT"Off         "
270 LOCATE 4,55:PRINT"Done" : FOR K = 1 TO 500 : NEXT
280 LOCATE 4,55:PRINT"    "
290 RETURN
295 '===================> Print Style Selection Subroutine <=============
300 IF IC<>0 GOTO 330
310 IC=1 : LOCATE 8,55:PRINT"Compressed Print  "
320 LPRINT CHR$(27);CHR$(23);:RETURN
330 IF IC<>1 GOTO 360
340 IC=2 : LOCATE 8,55:PRINT"Condensed  Print  "
350 LPRINT CHR$(27);CHR$(20);:RETURN
360 IF IC<>2 GOTO 390
370 IC=3 : LOCATE 8,55:PRINT"NLQ - Proportional"
380 LPRINT CHR$(27);CHR$(17);:RETURN
390 IF IC<>3 GOTO 420
400 IC=4 : LOCATE 8,55:PRINT"NLQ - Normal      "
410 LPRINT CHR$(27);CHR$(18);:RETURN
420 IF IC<>4 GOTO 450
430 IC=5 : LOCATE 8,55:PRINT"NLQ - Compressed  "
440 LPRINT CHR$(27);CHR$(29);:RETURN
450 IF IC<>5 GOTO 480
460 IC=6 : LOCATE 8,55:PRINT"Micro Font        "
470 LPRINT CHR$(27);CHR$(77);:RETURN
480 IC=0 : LOCATE 8,55:PRINT"Normal     Print  "
490 LPRINT CHR$(27);CHR$(19);:RETURN
495 '===================> Elongation Selection Subroutine <===============
500 IF IE<>0 GOTO 530
510 IE=1 : LOCATE 10,55:PRINT"On "
520 LPRINT CHR$(27);CHR$(14);:RETURN
530 IE=0 : LOCATE 10,55:PRINT"Off"
540 LPRINT CHR$(27);CHR$(15);:RETURN
545 '===================> Bold Print Selection Subroutine <===============
550 IF IB<>0 GOTO 580
560 IB=1 : LOCATE 12,55:PRINT"On "
570 LPRINT CHR$(27);CHR$(31);:RETURN
580 IB=0 : LOCATE 12,55:PRINT"Off"
590 LPRINT CHR$(27);CHR$(32);:RETURN
595 '===================> Italics Selection Subroutine <==================
600 IF II<>0 GOTO 630
610 II=1 : LOCATE 14,55:PRINT"On "
620 LPRINT CHR$(27);CHR$(66);CHR$(1);:RETURN
```

```
630 II=0 : LOCATE 14,55:PRINT"Off"
640 LPRINT CHR$(27);CHR$(66);CHR$(0);:RETURN
645 '===================> Underline Selection Subroutine <================
650 IF IU<>0 GOTO 680
660 IU=1 : LOCATE 16,55:PRINT"On "
670 LPRINT CHR$(15);:RETURN
680 IU=0 : LOCATE 16,55:PRINT"Off"
690 LPRINT CHR$(14);:RETURN
695 '===================> Super/Sub Script Selection Subroutine <=========
700 IF IS<>0 GOTO 730
710 IS=1 : LOCATE 18,55:PRINT"Super Script"
720 LPRINT CHR$(27);CHR$(83);CHR$(0);:RETURN
730 IF IS<>1 GOTO 760
740 IS=2 : LOCATE 18,55:PRINT"Sub Script  "
750 LPRINT CHR$(27);CHR$(83);CHR$(1);:RETURN
760 IS=0 : LOCATE 18,55:PRINT"Off         "
770 LPRINT CHR$(27);CHR$(88);:RETURN
775 '===================> Character Set Selection Subroutine <============
780 IF CS<>0 GOTO 810
790 CS=1 : LOCATE 6,55:PRINT"IBM    "
800 LPRINT CHR$(27);CHR$(58);:RETURN
810 IF CS<>1 GOTO 840
820 CS=2 : LOCATE 6,55:PRINT"USA - Tandy"
830 LPRINT CHR$(27);CHR$(89);CHR$(32);:RETURN
840 IF CS<>2 GOTO 870
850 CS=3 : LOCATE 6,55:PRINT"Germany    "
860 LPRINT CHR$(27);CHR$(89);CHR$(33);:RETURN
870 IF CS<>3 GOTO 900
880 CS=4 : LOCATE 6,55:PRINT"France "
890 LPRINT CHR$(27);CHR$(89);CHR$(34);:RETURN
900 IF CS<>4 GOTO 930
910 CS=5 : LOCATE 6,55:PRINT"Norway "
920 LPRINT CHR$(27);CHR$(89);CHR$(35);:RETURN
930 IF CS<>5 GOTO 960
940 CS=6 : LOCATE 6,55:PRINT"Sweden "
950 LPRINT CHR$(27);CHR$(89);CHR$(36);:RETURN
960 IF CS<>6 GOTO 990
970 CS=7 : LOCATE 6,55:PRINT"Denmark"
980 LPRINT CHR$(27);CHR$(89);CHR$(37);:RETURN
990 IF CS<>7 GOTO 1020
1000 CS=8 : LOCATE 6,55:PRINT"Finland"
1010 LPRINT CHR$(27);CHR$(89);CHR$(38);:RETURN
1020 IF CS<>8 GOTO 1050
1030 CS=9 : LOCATE 6,55:PRINT"Italy  "
1040 LPRINT CHR$(27);CHR$(89);CHR$(39);:RETURN
1050 IF CS<>9 GOTO 1080
1060 CS=10: LOCATE 6,55:PRINT"Spain  "
1070 LPRINT CHR$(27);CHR$(89);CHR$(40);:RETURN
1080 IF CS<>10 GOTO 1110
1090 CS=11: LOCATE 6,55:PRINT"England"
1100 LPRINT CHR$(27);CHR$(89);CHR$(41);:RETURN
1110 IF CS<>11 GOTO 1140
1120 CS=12: LOCATE 6,55:PRINT"Belgium"
1130 LPRINT CHR$(27);CHR$(89);CHR$(42);:RETURN
1140 CS=0 : LOCATE 6,55:PRINT"Tandy  "
1150 LPRINT CHR$(27);CHR$(59);:RETURN
```

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By Chuck Bates, W6JWX

Program Transfer

Using the C-64® and the Pakratt-64®

Shortly after getting a Packratt-64a® and checking out a number of the local Bulletin Boards it became 'painfully obvious' there just weren't any C-64 programs stored 'out there'. Being very satisfied with the C-64's capability, I bought it about 3 years ago, I immediately shouted HELP!! There seemed to be a lot of confusion on what this 'unusual' machine would and wouldn't do. Here is what I have found out.

The C-64 will do just about anything that IBM, Apple, TRS or Xerox 8 bit machines can do. Yes, the problem is how to interface or modify the PET ASCII to the standard ASCII that most other machines have in common. The other machines use a 7 bit ASCII system while the C-64 uses a 8 bit ASCII system.

The Difference

To explain, 7 bit ASCII has a 'sync' eighth bit, a carryover from the old Teletype systems which needed a 'start bit' to tell the system 'here comes a new character'. Commodore, starting with a new machine, by the 'hex' (HEXIDECIMAL) number system. The 8 bit microprocessors use two hex characters when working, each one having sixteen (0 to F) possible numbers available. 16 times 16 equals 256, therefore 256 combinations are possible using 8 bits. Commodore capitalized on this and developed a coding system using up most of the 256 available combinations. This added the GRAPHIC capability for which Commodore is well known. Atari did something similar. The only major ASCII, change introduced was, for reasons better known to Commodore, changing the coding numbers used for the 'upper' and 'lower' case alphabet. Capital ASCII is decoded on a 'standard' ASCII machine. Also, the 'standard' machines ignore the 'added' graphic characters and many of the 'special control' characters which were also added. I personally think the 'PET' system makes better use of an 8 bit 'chip' than 'BIG BLUE' and many of the other manufactureers who 'locked in' standard ASCII. Which I will call 'PLAIN VANILLA'.

Now that you understand the 'problem' encountered when trying to communicate with other machines. Let's look at AEA and the PACKRATT-64. AEA decided that this problem was a 'major one' and took a very logical direction toward it's solution. They decided to use PLAIN VANILLA ASCII for all text in the PACKET screen mode and within their most excellent programming converted the 'keyboard strokes' to the PLAIN VANILLA ASCII equivalents in 'conv' mode. They also set up a 'trans' (TRANSPARENT) mode that will transmit 'special control' and 'graphic' characters through the TNC. Yep, you can transmit any PET ASCII characters direct to any machine that can 'read' them. IBM, TRS, Xerox and most others can't.

With some help from N6ARE and WB6MKA, and being retired, I took on a 'personal' project to see if this 'gap' could be bridged. Yes, it can and the 'unsurmountable' is no longer 'unsurmountable'. It may cause you a little bit of 'new learning how' but once you have the necessary programs you can do it quite easily.

First, 'SEQ' (SEQUENTIAL) file format was the obvious way to go because the Packratt-64 normally uses SEQ files. SEQ files are also easy to read and change. It is also easy to change BASIC LISTABLE programs to SEQ format using the computer in 'DIRECT' mode (i.e. -- using keyboard input, no line numbers). Here is how you convert a basic 'PRG' file to a 'SEQ' file:

1. LOAD and LIST the PROGRAM then for safety insert another FORMATTED disk on which to write.

2. Type: OPEN 15,8,15, "I0" <RETURN>

This resets the Disk Drive to the 'new' disk.

3. Type: OPEN 8,8,8,"0:(filename), S,W" <RETURN>

Use a (filename) not on the 'new' disk.

4. Type: CMD8:LIST <RETURN>

This starts the writing on the disk.

5. Wait for the 'flashing' CURSOR to reappear then-

Type: PRINT#8: CLOSE8:CLOSE15

```
            SEQUENTIAL TO PROGRAM FILE CONVERTER

63000 POKE826,0:POKE827,0:POKE52,84:POKE56,84:CLR:FORI=1TO5000:
      NEXT:CLR
63001 GOSUB63016:PRINT"       SEQ TO PRG FILE CONVERTER":
      POKE53280,3:POKE53281,1
63002 PRINT:PRINT:PRINT:INPUT"FILE TO BE CONVERTED";NA$:PRINT:
      PRINT:PRINT"NOW READING THE FILE..."
63003 OPEN15,8,15,"IO":OPEN8,8,8,"0:"+NA$+",S,R":INPUT#15,
      EN,ER$,ET,ES
63004 IFEN±°0THEN PRINT"DISK ERROR: ";ER$:CLOSE8:PRINT#15,"IO":
      CLOSE15:STOP
63005 C=C+1:GET#8,A$:RS=ST:POKE21510+C,ASC(A$):IFRS±°64THEN63005
63006 CLOSE8;POKE21510+C+1,61:POKE21510+C+2,13:PRINTCHR$(147):
      PRINT:PRINT:FORI=63000TO63007
63007 PRINTI:NEXT:PRINT"RUN63008"CHR$(19)"";:POKE198,10:
      FORI=631TO640:POKEI,13:NEXT:END
63008 PRINTCHR$(147):PRINT:PRINT:CLR
63009 C=(PEEK(826)*100)+PEEK(827)+21510
63010 IFPEEK(827)=100THENPOKE826,(PEEK(826)+1):POKE827,0
63011 POKE827,(PEEK(827)+1):PRINTCHR$(PEEK(C));:
      IFPEEK(C)±°13THEN63009
63012 IFPEEK(C-1)=61THENPRINTCHR$(147):PRINT:PRINT:FORI=1TO9:
      PRINT63007+I:NEXT:GOTO63014
63013 PRINT:PRINT:PRINT:PRINT"GOTO63008"CHR$(19);:POKE198,10:
      FORI=631TO640:POKEI,13:NEXT:END
63014 POKE826,0:POKE827,0:POKE52,160:POKE56,160:CLR
63015 PRINT"LIST"CHR$(19);:POKE198,10:FORI=631TO640:POKEI,13:
      NEXT:END
63016 PRINTCHR$(147)CHR$(151):RETURN:
```

<RETURN>

The 'drive' light should go out.

Now you have the PRG in SEQ format except the word 'READY' has been appended to the end of the file. This can cause problems in sime cases so I usually load the 'new' SEQ file into the Pakratt-64 and using the excellent editing capability DELETE the 'READY' and then SAVE the final version. You will note the PROGRAM is displayed by the Pakratt-64 just like you would type it in. (i.e.--Line #, Program information and a carriage return).

Now, the reverse situation (SEQ to PRG) is not nearly so simple. The computer and disk drive use TOKENS to operate. These TOKENS are automatically generated by the computer and the 'intelligent' disk drive for their own internal operation. I have yet to find a 'table' which lists these in a usable format.

There is a simple (17 line) program which 'TOKENIZES' a SEQ format file which I will list here in the event you want to type it in. A word of caution when typing it in. To get it into the machine, you must use '?' for the word 'PRINT' wherever it appears, as several lines are too long for the machine to accept them. **BE SURE to SAVE** it before 'running it'. **IT SELF-DESTRUCTS!!** It is horribly slow being in BASIC language and uses the 'dynamic screen' technique to enter lines into the computer memory. It reads the entire SEQ file before starting the 'loading'. The process uses two bytes of memory for each character being converted to a TOKEN. Consequently you are limited to about 17500 byte program lengths (68 blocks) -- this isn't a problem as a 68 block BASIC program is pretty darn large. It's also close to the limit of the transmitting buffer in the Pakratt-64.

Here 'tis:

You will note this program finishes up with a reversed LIST on the screen providing you deleted READY, or isolated it. It may end up with a SYNTAX ERROR if 'READY' is left on the end of the SEQ file. Don't fret, merely entering 'LIST' on a blank line will show you what is in the machine or in the case of the properly prepared SEQ file 'RETURN' will LIST. You can delete READY and SAVE the PRG normally.

Any illegal line (over 80 characters) will not be accepted and will result in the program not DESTRUCTING properly. Now, you'll have to LIST what you have and make appropriate corrections-heaven forbid!

After running the program once and languishing over two cups of coffee while it is processing the file, don't despair. There is a faster way. More on that later.

OK, now we have a way to handle BASIC programs of the PLAIN VANILLA variety. The process isn't limited to PLAIN VANILLA but most BBS systems are and the above uses the smaller amount of BBS storage space. Many programs can be easily made PLAIN VANILLA by using the CHR$ codes for the REVERSED screen characters. I recommend this when easy to do.

Now for the 'toughies' WB4ZOJ has circulated a program called HEX + UNHEX IT that fixes the problem of transmitting and storing PET ASCII characters on non-Commodore machines. His documentation is excellent. In fact he has improved the program several times. It works with MACHINE LANGUAGE programs too. It is too complex to ask Chet to use the 'space' in **CTM** but again, don't despair, more later.

WB4ZOJ's program takes advantage of converting a program into HEX which all 8 bit machines can read. His original version is a bit slow but a 'compiled' version works fast enough, at least lots of things happen 'pretty fast'. The only problem with using HEX is that the program doubles in size when converted. Remember the 17500 byte limit in the Pakratt-64 transmitting buffer (cuts the program size to about 34 blocks). This occasionally causes 'unusual' things like 'no workee' to happen. Too bad the Pakratt-64 can't send and receive directly to disk, to me that's the major limitation it has. I have checked with AEA and the way they have inserted the program into the machine it's just impossible to have the machine do two operations simultaneously.

All right, now the solution for getting the programs in a format which saves typing and in 'fast' machine language and/or 'compiled' versions. I will be happy to copy them (no charge) onto a disk for any ham sending me a 'BLANK' in a 'MAILER' containing RETURN POSTAGE and a RETURN LABEL. For information the disk also has 'docs' and some other programs on 'beam antenna' direction, tower wind loading, also a few miscellaneous utilities I use such as an 80 column screen display that works with word processors or any other program not using the cassette buffer area.

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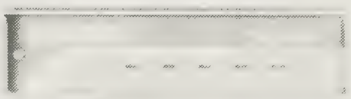

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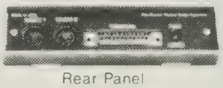

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By Robert D. Hartung

Musings and Meanderings

Extending the Power of the TS2068

With fewer TS-2068 articles appearing in **CTM** and other T/S publications, some readers have inquired about buying one of the new or used 2068s they see advertised. Of course any warranty is only as good as the word of the person making it but, assuming the buyer receives written assurance it is being sold in good working condition, I personally feel this computer is still as good a buy as it ever was for a first-time user who wants something that is practical, easy to use, and has all the capabilities the majority of such users will probably really need. For a previously-owned computer with power supply and manual, the delivered price should be something less than the $126. for which E. Arthur Brown Co. will ship a new one.

Recently I bought another one myself as back-up insurance for all the additions I have made to my TS-2068 system. This raises the question why anyone in their right mind would put into add-ons and peripherals more than 5 times the original cost of a computer that has not been manufactured in the U.S. since early 1984. I readily admit sanity is not one of my strong points but, that aside, although I would enjoy as much as anyone getting my hot, greedy fingers on every state-of-the-art PC that comes along, I can't think of anything I really need a computer for that I can't do with my present system.

However, I would warn any newcomers that most veteran T/S users have long ago gotten used to the looks of condescension if not outright pity whenever someone with a "big name" system asks them what they are using. It is said that someone once made fun of Lincoln's long skinny legs by asking him, "Just how long do any man's legs need to be?" He replied, "Just long enough to reach the ground." And that bit of wisdom reminds me not to eat my heart out that I can't afford to keep up with the latest and greatest when what I now have "reaches the ground" adequately if not always elegantly and at a fraction of the cost for software.

Actually, most T/S users do not realize "the power that is in your hands," as the ads used to say during the very few months that Timex actually promoted the TS-2068. From time to time I have read critical comments about its "quirky way of keying-in commands" and "design bugs" in the ROM. True, the single-stroke keywords might cause some confusion to anyone switching back and forth between it and another computer, but those who have only a 2068 find it easy to use without having to key in the exact spelling of each command word. Regarding the so-called ROM bugs, aside from a few minor ones that most users will never encounter, those who are knowledgable on the subject tell me that many of these are actually "vestigial appendages" of an original working system that would have put the TS-2068 far ahead of its nearest competitors at the time it was put on the market.

There has been speculation that these were purposely disabled to provide a "planned obsolescence" so that progressively up-dated "new" models could be more economically introduced, or else some kind of deal may have been struck so that the ROM would be deliberately sabotaged and never allowed to compete on the open market. I do not know if either was the case, but I have talked with those who have restored the original operating system for their own use and they tell me its capabilities, such as accessing megabytes of add-on memory banks, were far ahead of its time. Whether anyone will ever be able to afford the megabuck fees required to obtain license to go public with these enhanced ROMs apears doubtful.

However, as is, the available support for the Ts-2068 gives users more cmputing power than most of us will ever use. Of course, those who need compatibility with the systems they use at their work will of necessity have to go that route. For myself, aside from programming as a hobby, almost all my other use is for data filing, word-processing usually less than five pages at a time, and driving a printer to make hard copes and address envelopes. For this, I have modified ProFile, Tasword, and my own programs to utilize my Oliger DOS to best advantage. I haven't gotten into modems, mostly because my phone bill is too high already!

Sinc a full-size printer and disk system are probably the biggest investments a T/S user makes, it might be helpful to someone who hasn't yet made the leap if I were to share some of my learning experiences with these. Excellent NLQ (near letter Quality) dot-matrix printers now are available in a price range of about $180 and up as compared to the $350 I paid for mine only 3 years ago. A Centronics-type parallel IF (interface) and cable will be required to transfer the printing data between the computer and printer. Any parallel printer may be used with such an IF as well as with another computer, provided you have the proper IF for each. The imported Tasman IF was popular with T/S users for about three years but now the Aerco, Byte-Back, Foote, and Oliger made in the U.S. are the principal one available at prices from $50 to $70, including a printer cable.

A disk operating system (DOS) also requires a special interface consisting of hardware and software to communicate complex data and command signals between the computer and the disk drives. Aerco, Oliger, Zebra, and Larken each offer certain capabilities so it would be well to compare all available info and reviews before ordering. Since I have the Oliger JLO SAFE DOS V2.32, I am better able to describe a set-up with that than with the others. (**CTM** has recently carried reviews on the JLO, so I will not go into details on its command functions exccept for a few that have been added to this version.)

The hardware consists of an expansion board and two component cards which plug into it, leaving the cartridge port free for other devices. MOS ICs are used to avoid overloading computer circuits. Two spare slots are provided for future expansions as well as a feed-thru edge connector to which your printer I.F. may be connected. The IF will work with either 40 or 80-track double-sided drives (or up to 255-track if they were available). The interface cards, expansion board, and cable cost $189.95.

I chose to go with CDC 5 1/4" 96TPI (trancks per inch) drives which I purchases "as is" for about $35 each from Central Sales, Duluth, (218) 624-5749. All 5 that my brother and I bought together were in good to excellent condition, with 3 of them not even having any scratch marks on the edgeboard connector, indicating theyf had never been used before. With two of these drives, disks may be formatted to 83 tracks per side to give over 1.6 megabytes of capacity in all, or 3.3 megabytes with four drives. Since I already had a well-filtered 13.8 VDC 4 amp power supply, I simply mounted two 5 volt and two 12 volt 1.5 amp regulators on a large extruded aluminum heatsink to provide power for the drives. I would add that John Oliger was most helpful in patiently answering all my "dumb questions."

The JLO system is supplied on EPROM with its own RAM so it does occupy any computer memory. Also on the EPROM is printer driver software that works with either the Aerco or JLO Fs. In V2.32 a new FOR/NEXT loop command is supported which runs at constant speed anywhere in a listing -- about 10 times faster than the normal T/S loop at the beginning of a listing and over 35 times faster at the end of a long program. The system is designed to be completely compatible with Ray Kingsley's OKDOS when it becomes available by just plugging in a component card.

Each SAVE is automatically verified upon completion, and the integrity of individual programs on a disk may be verified if desired. Selected programs may be moved from disk to disk or an entire disk may be copied to another. NMI SCREEN$ saves may be made at the touch of a button as well as program saves which store the complete state of the computer system and all of RAM in 4 seconds. The NMI button will also stop runaway MC programs.

Included in the comprehensive manual are programs which by just keying LOAD will automatically display a catalog of everything on a disk, up to 177 titles, and then load or move any cursor-selected program or data at the touch of a key in less than four seconds, most in one or two. A short routine may be inserted into programs such as ProFile, Tasword, or Mscrip to provide sequential loading of newe data, giving in effect almost immediate access to over 1.6 megabytes of disk-memory if two 96TPI drives are used, or twice that if four are used.

With this "power that is in my hands," plus the compiling speed of Timachine, and access to all the extended capabilities of Beta Basic whenever I want to use any of its more than 100 new and enhanced commands, I find it hard to feel sorry for myself that I don't have one of the "compatibles" that in one stroke Big Blue can suddenly make incompatible.

Robert D. Hartung
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By William McMullan, KE5L

Message Handling Made Easy

Every since I have been in ham radio, I have been intimidated by message handling. Never sure that the format I used was correct, and not wanting to look like a dummy, I have put off sending messages by ham radio. If this sounds like you, then I've got the answer, providing you have a computer running basic, and most hams do.

I am a nut about packet radio, and I've found that most people in packet, don't know how to send NTS traffic via packet BBS's. Packet is a natural for traffic and most hams love to deliver messages, especially good will messages, but hate the drudgery of checking into nets and waiting for traffic that never seems to come, and filing messages. On a packet BBS you check in and If you see an NTS message, you dump it into your buffer, make a printed copy, make a phone call, and someone on the other end is very happy. With this program you can answer the prompts and a reply to the message you just delivered is created, and saved on disk. You even use local time and dates if you want, and the computer will convert them for you. The check sum is automatic too. Now all you have to do is check back into the BBS and dump the message. Simple, now message handling is fun, and you are ready to get to the computer and type in the program, wait... finish reading this first, it may save you some typing.

In lines 60 thru 100 there are five function calls defined, They are used in lines 1610 and 1620 to keep track of the GMT date. If you plan to use the computers date and time, be sure to set the time and date in the computer before running the program or you will get an error message. Check you DOS manual for syntax.

At the beginning of this program the file MSGNUM/DAT is read (see lines 130 thru 170), if it has not been created, one is created and then the LOF is checked, if it is 0 then the beginning number will be 100, see line 135.

Next the program will ask you to enter an 'L', the computer checks to see if you are in upper case, if not you are prompted to lock in upper case. This is done in lines 200 and 210. Line 200 might not be compatible with your computer, if not change it to read: 200 DUMMY$="":DUMMY$=INKEY $:IF DUMMY$="" THEN GOTO 200

Next you will be prompted for a number, if you press enter you will get the number that is stored on disk, if you choose to enter a number, then a new series of numbers will be started from that point, see lines 130 thru 160 and 220 thru 260. Each time you write a message the number is incremented by one and written to disk in a file named 'MSGNUM/DAT' see lines 1480 thru 1520. Do not use numbers less than 100 or greater than 999 if this does not comform to your operations then a little rewriting is in order in the area of line 280. Now most of us hams are ashamed to admit that they have sent less than 100 messages, so I chose 100 as a starting point.

Next you will be prompted for a precedence, Emergency, Priority, or Routine. Their descriptions are there to remind you, see lines 290 thru 460.

Then you will be prompted for message handling instructions, descriptions are on screen. On three of the handling instructions you will be prompted for additional information, See lines 480 thru 760.

In line 780 you will be prompted for station of origin, if you change my call in line 790 to your call then all you have to do is press enter if you are the originating station, otherwise if you are relaying a message type the originating stations call. Be sure to change line 780 to reflect the default call.

Place or origin is the same situation as the above, see lines 800, and 810. Pressing ENTER at the time and date prompts use the computers time and date, it assumes the time is in local 24 hour time, if you enter the time and date then the computer checks to see if there is a 'Z' at the end of the time, if not it will convert the time to zulu (GMT) time, and if the time is greater than 2400 the date will incremented and the time adjusted accordingly. See lines 820 thru 870, 890 thru 920 and 1550 thru 1640 plus the function calls discussed at the first of this article. A lot of this fat could have been left out, but why have a computer if not to make things more convenient. If you are in a different time zone, or the local time changes to daylight savings ect., change line 110.

In lines 960 thru 1000 you are prompted for addressee information, they are straight forward and shouldn't need any additional explanation. Be sure not to use any punctuation marks, remember this message may be forwarded by CW later on.

Message text is entered in line 1020, lines 1030 thru 1140 process the text lines and count words for the check sum. Only upper case characters are accepted. After each line of text is written, you will be asked if you want another line. Periods are converted to 'X', after the last line is written you will be asked for a signature, this will be the name of the person sending the message.

Now you will be prompted for hard copy, if you answer 'Y' then line 1216 will set up a link between the video display and the printer, after the message is displayed, the link is turned off in line 1325. If this does not work with your system you could simply remove lines 1214, 1216 and 1325 and after the message is displayed, do a screen print.

Almost finished, now that you have been shown the message, if you are satisfied then answer 'Y' to the prompt and the message will be written to disk, Its file name will be ' NUMnnn/MSG ', nnn being the message number. The message number will be incremented and written to its file and you will be asked if you want to write another message.

At this point you can load the file of the message created into the buffer of your packet, rtty or cw keyboard and send it with little effort.

This program was written on the TRS80 Model IV but should run on the IBM compatible with very few changes. Changes necessary for the IBM compatible will be in the area of file names. For the model 3 and some of the other computers, the LINE INPUT key words will have to be changed to INPUT and the WHILE/WEND statements will need to be changed as discussed at the first of the article. I've tried to use language that is common to most computers running microsoft basic, I'm sure there could be some problem areas I may have missed, so keep your computer manual handy.

It would be very little trouble to re-write some of this program so that you could file messages with MARS, also you could write it so that you could cross from one system to the other, but I'll leave that up to you for now.

On the W0RLI and similar BBS's at the MAIN prompt type 'ST NTS/XX' where XX is the two letter abbreviation for the state. Then at the MESSAGE subject prompt type 'QTC:CITY,STATE' destination city/state. Then when you get the prompt for the text of your message, dump your message from you buffer. What could be easier…

I hope you have as much fun using this program as I have writing it, I plan to be a more active message handler in the future, I'll bet you will too.

73's,
Willy McMullan, KE5L
Rt 6 Box 1
Bastrop, LA 71220 **CTM**

```
10 REM  FILE NAME 'MESSAGE/BAS'    VER. 1.0    12/17/86
20 REM  WRITTEN BY WILLIAM MCMULLAN  KE5L
30 REM  RT 6 BOX 1 BASTROP, LA. 71220
40 REM  PH. (318) 281 4248
50 CLEAR
60 DEF FN DN!(Y%,M%,D%)=Y%*365+INT((Y%-1)/4)+(M%-1)*28+VAL(MID$("
    00030306081113161921 2426",(M%-1)*2+1,2))-((M%>2)AND((Y%AND N
    OT -4)=0))+D%
70 DEF FN RY%(N!)=INT((N!-N!/1461)/365)
80 DEF FN RJ%(N!)=N!-(FN RY%(N!)*365+INT((FN RY%(N!)-1)/4))
90 DEF FN RM%(J%,Y%)=-((Y%AND NOT -4)<>0)*(1-(J%>31)-(J%>59)-(J%>
    90)-(J%>120)-(J%>151)-(J%>181)-(J%>212)-(J%>243)-(J%>273)-(J
    %>304)-(J%>334))-((Y%AND NOT -4)=0)*(1-(J%>31)-(J%>60)-(J%>9
    1)-(J%>121)-(J%>152)-(J%>182)-(J%>213)-(J%>244)-(J%>274)-(J%
    >30))
100 DEF FN RD%(Y%,M%,J%)=(J%-((M%-1)*28+VAL(MID$("000303060811131
    61921 2426",(M%-1)*2+1,2))))+((M%>2)AND((Y%AND NOT -4)=0))
110 ZULU=6 : REM ***** GMT TIME ADD 6 IN CENTRAL USA
120 REM ****** MSN IS MESSAGE NO. *****
130 OPEN "D",1, "MSGNUM/DAT",10
135 K=LOF(1): IF K=0 THEN MSN=100 : CLOSE : GOTO 180
140 FIELD 1,10 AS MS$
150 GET 1
160 CLOSE 1
170 MSN=CVS(MS$)
180 CLS
```

```
190 PRINT "PRESS THE 'L' KEY  "
200 DUMMY$="":WHILE DUMMY$="":DUMMY$=INKEY$:WEND
210 IF DUMMY$="L" THEN 220 ELSE PRINT "LOCK INTO UPPER CASE AND T
    RY AGAIN":GOTO 200
220 CLS:PRINT "THIS IS MESSAGE NO."MSN
230 PRINT "If you want to use a new series of numbers then ENTER
    the"
240 PRINT "number that you want the series to begin with.  The ne
    xt"
250 PRINT "Message number will be stored on disk (no number less
    than 100)"
260 PRINT:INPUT "ENTER NUMBER OR PRESS ENTER TO CONTINUE ";NUMBER
    $
270 IF NUMBER$="" THEN 280 ELSE MSN=VAL(NUMBER$)
280 FILE$="NUM"+RIGHT$(STR$(MSN),3)+"/MSG"
290 CLS:PRINT "CHOOSE PRECEDENCE"
300 PRINT
310 PRINT "1 = EMERGENCY -  Any message having life and death urg
    ency to any person"
320 PRINT "                 or group of persons. When in doubt, d
    on't use it."
330 PRINT
340 PRINT "2 = PRIORITY  -  Important messages having a specific
    time limit."
350 PRINT "                 Official messages not covered in the
    Emergency"
360 PRINT "                 category. Press dispatches and emerge
    ncy related"
370 PRINT "                 traffic not of utmost urgency. Death
    notices or "
380 PRINT "                 injury in a disaster area."
390 PRINT
400 PRINT "3 = ROUTINE   -- Most traffic in normal times."
410 PRINT
420 LINE INPUT "                   ENTER CHOICE ";DUMMY$
430 IF DUMMY$="1" THEN PR$="EMERGENCY"
440 IF DUMMY$="2" THEN PR$="PRIORITY"
450 IF DUMMY$="3" THEN PR$="ROUTINE"
460 IF DUMMY$="" THEN 280
470 CLS
480 PRINT "CHOOSE HANDLING INSTRUCTIONS"
490 PRINT
500 PRINT "1 = HXA -- (Followed by number.) Collect landline deli
    very"
510 PRINT "           authorized by addressee within ... miles. (
    if no"
520 PRINT "           number, authorization is unlimited.)
530 PRINT
540 PRINT "2 = HXB -- (Followed by number) Cancel message if not
    delivered"
550 PRINT "           within .... hours or filing time; service o
    rg. station."
560 PRINT
570 PRINT "3 = HXC -- Report date and time of delivery (TOD) to o
    rg. station."
580 PRINT
590 PRINT "4 = HXD -- Report to org. station the id of station fr
    om which rcvd"
```

```
600 PRINT "              or relayed plus date and time, or if delive
     red report"
610 PRINT "              date, time and method of delivery."
620 PRINT
630 PRINT "5 = HXE -- Delivering station get reply from addressee
     , org. msg back"
640 PRINT
650 PRINT "6 = HXF -- (Followed by number). Hold delivery until .
     ...(date)."
660 PRINT
670 PRINT "7 = NONE - No handling instructions"
680 PRINT:LINE INPUT "ENTER CHOICE  ";DUMMY$
690 IF DUMMY$="1" THEN LINE INPUT "ENTER NUMBER OF MILES  ";NUM$:
     HX$="HXA"+NUM$
700 IF DUMMY$="2" THEN LINE INPUT "ENTER NUMBER OF HOURS  ";NUM$:
     HX$="HXB"+NUM$
710 IF DUMMY$="3" THEN HX$="HXC"
720 IF DUMMY$="4" THEN HX$="HXD"
730 IF DUMMY$="5" THEN HX$="HXE"
740 IF DUMMY$="6" THEN LINE INPUT "ENTER DATE  ";NUM$:HX$="HXF"+N
     UM$
750 IF DUMMY$="7" THEN HX$=""
760 IF DUMMY$="" THEN 470
770 CLS
780 LINE INPUT "ENTER STATION OF ORIGIN (DEFAULT IS KE5L)     ";S
     TO$
790 IF STO$="" THEN STO$="KE5L":REM **** PUT YOUR CALL SIGN HERE
     AS A DEFAULT
800 LINE INPUT "ENTER PLACE OF ORIGIN (DEFAULT IS BASTROP LA) ";O
     RG$
810 IF ORG$="" THEN ORG$="BASTROP LA":REM *** PUT YOUR LOCATION H
     ERE AS DEFAULT
820 PRINT "ENTER TIME FILED 'hh:mm' (must use colon)"
830 LINE INPUT "OR PRESS ENTER TO USE COMPUTERS TIME ";TI$
840 IF TI$="" THEN GOSUB 1550:GOTO 890
850 ND=0:T=VAL(LEFT$(TI$,2)):IF RIGHT$(TI$,1)<>"Z" THEN T=T+ZULU
860 IF T>23 THEN T=T-24:ND=1
870 TI$=STR$(T)+MID$(TI$,4,2)+"Z"
880 IF VAL(TI$) < 1000 THEN TI$="0"+RIGHT$(TI$,4)
890 PRINT "ENTER DATE FILED  'mm/dd/yy'"
900 LINE INPUT "OR PRESS ENTER TO USE COMPUTERS DATE ";DAT$
910 IF DAT$="" THEN GOSUB 1590:GOTO 940
920 IF ND=1 THEN GOSUB 1600:GOTO 940
930 DAT$=LEFT$(DAT$,2)+MID$(DAT$,4,2)+RIGHT$(DAT$,2)
940 PRINT
950 PRINT "In the following, do not use punctuation marks."
960 LINE INPUT "ENTER CALL SIGN OF ADDRESSEE IF HAM  ";HC$
970 LINE INPUT "ENTER NAME OF ADDRESSEE              ";NA$
980 LINE INPUT "ENTER ST. ADDRESS OF ADDRESSEE       ";ST$
990 LINE INPUT "ENTER CITY/ST OF ADDRESSEE           ";CS$
1000 LINE INPUT "ENTER PHONE NO. OF ADDRESSEE         ";PH$
1010 CLS
1020 LINE INPUT "ENTER MESSAGE (KEEP LINES TO 80 CHAR.)
                                             ";LE$(N)
1030 LE$(N)=LE$(N)+" "
1040 LL=LEN(LE$(N))
1050 FOR C=1 TO LL:L$=MID$(LE$(N),C,1)
1060 R=C-1:IF R=0 THEN R=1
```

```
1070 L1$=MID$(LE$(N),R,1):IF L1$=" " AND L$=" " THEN 1120
1080 IF L$=" " THEN CK=CK+1:GOTO 1110
1090 IF L$="." THEN L$= " X":GOTO 1110
1100 IF ASC(L$) < 48 OR ASC(L$) > 90 THEN L$=""
1110 LI$(N)=LI$(N)+L$
1120 NEXT C
1130 IF N=0 THEN LI$(0)="BT "+LI$(0)
1140 CK$=STR$(CK)
1150 LINE INPUT "DO YOU WANT ANOTHER LINE Y/N  ";DUMMY$
1160 IF DUMMY$ <> "Y" AND DUMMY$ <>"N" THEN 1150
1170 IF DUMMY$="N" THEN LI$(N)=LI$(N)+ " BT":GOTO 1190
1180 IF DUMMY$="Y" THEN N=N+1:GOTO 1020
1190 LINE INPUT "ENTER SIGNATURE (NAME OF PERSON CREATING MSG) ";
     SG$
1200 REM ************ PRINT OUT MSG ******************
1210 CLS
1214 LINE INPUT "DO YOU WANT A HARD COPY OF YOUR MESSAGE <Y>/<N>
     ";DUMMY$
1216 CLS:IF DUMMY$="Y" THEN SYSTEM "LINK *DO *PR"
1220 MSN$=STR$(MSN):MSN$=RIGHT$(MSN$,LEN(MSN$)-1)
1230 PRINT MSN$" "PR$" "HX$" "STO$" "CK$" "ORG$" "TI$" "DAT$
1240 PRINT "TO: "HC$
1250 PRINT "    "NA$
1260 PRINT "    "ST$
1270 PRINT "    "CS$
1280 PRINT "    "PH$
1290 FOR X=0 TO N
1300 PRINT LI$(X);
1310 NEXT X
1320 PRINT " "SG$
1325 IF DUMMY$="Y" THEN SYSTEM "RESET *DO"
1330 PRINT:LINE INPUT "DO YOU WANT TO SAVE THIS MESSAGE <Y>/<N> "
     ;DUMMY$
1340 IF DUMMY$="Y" THEN 1350 ELSE 50
1350 OPEN "O",2,FILE$
1360 PRINT# 2,MSN$" "PR$" "HX$" "STO$" "CK$" "ORG$" "TI$" "DAT$
1370 PRINT# 2,"TO: "HC$
1380 PRINT# 2,"    "NA$
1390 PRINT# 2,"    "ST$
1400 PRINT# 2,"    "CS$
1410 PRINT# 2,"    "PH$
1420 FOR X=0 TO N
1430 PRINT# 2,LI$(X);
1440 NEXT X
1450 PRINT# 2," ";SG$
1460 PRINT# 2,CHR$(0);CHR$(0)
1470 CLOSE 2
1480 MSN=MSN+1:OPEN "D",1,"MSGNUM/DAT",10
1490 FIELD 1,10 AS MS$
1500 LSET MS$=MKS$(MSN)
1510 PUT 1,1
1520 CLOSE 1
1530 LINE INPUT "DO YOU WANT TO WRITE ANOTHER MESSAGE <Y>/<N>  ";
     DUMMY$
1540 IF DUMMY$="Y" THEN 50 ELSE SYSTEM
1550 ND=0:T=VAL(LEFT$(TIME$,2)):T=T+ZULU:IF T>23 THEN T=T-24:ND=1
1560 TI$=STR$(T)+MID$(TIME$,4,2)+"Z"
1570 IF VAL(TI$) < 1000 THEN TI$="0"+RIGHT$(TI$,4)
```

By Dave Garner, WA4YRK

Insights
A look at COMDEX

Another COMDEX® show has come and gone. The big personal computer industry show was held the first week of June in Atlanta at the World Congress Center where the up-coming ARRL convention will take place in July. COMDEX attendance was estimated at 50,000.

Several things of interest to the readers of this magazine were seen by your writer at this years's COMDEX.

First, a wave of new clones with IBM® PS/2 like features were displayed by such companies as NCR®, Zenith, and ITT®. The move to 3.5 inch disk drives was offered, as well as a move to improved graphics based on IBM's Video Graphics Array (VGA). The clone manufacturers have yet to move toward IBM's Micro Channel Bus. The delay is caused by engineering problems and legal problems with copying the IBM Micro Channel Bus. NCR offers an up-grade path for the addition of the new Micro Channel Bus, when and if it becomes cloneable.

IBM was showing a new PS/2 Model 60 running two 80286 processors. This dual processor approach gives us a first look at future expansion possibilities of the new Micro Channel architecture. Using the new bus structure with a combination of up to 16 co-processors could lead to a great leap in the current abilities and power of microcomputers. We are now looking at the possibility of mainframe like systems based on the new PS/2 architecture and the development of personal super-computers.

Hayes Microcomputer products introduced their new "V" series of modems. The new V-series modem products feature built-in error correction features and adaptive data compression which promises to double the transmission speed which promises to double the transmission speed while automatically choosing the most efficient data transfer speed.

New Lap-top computers with new backlit easy-to-read screens were introduced by NEC, Zenith, Toshiba®, and Samsung®. Sales of lap-top computers have been steadily increasing in the past few months.

New laser printers were very much in evidence. Laser printers are one of the hottest new products in the past year and will continue to replace daisy wheels as high quality printer purchases.

The latest rumor at this point is that Epson® will introduce a new computer product to the mass merchandisers such as Wal-Mart® and Service Merchandise® chains. The product is said to be similar to the Equity 1, and priced in the 700 to 900 dollar range. Many loyal dealers to Epson are very upset about this reported move by Epson to go mass market.

Until next time, happy computing…

Dave Garner, WA4RYK
10917 Sonja Drive
Concord, Tennessee 37922

CTM

```
1580 RETURN
1590 DAT$=DATE$
1600 Y%=VAL(RIGHT$(DAT$,2))+1900:D%=VAL(MID$(DAT$,4,2)):M%=VAL(LE
     FT$(DAT$,2))
1610 A!=FN DN!(Y%,M%,D%)+ND:Y%=FN RY%(A!):J%=FN RJ%(A!)
1620 M%=FN RM%(J%,Y%):D%=FN RD%(J%,M%,Y%)
1630 DAT$=RIGHT$(STR$(M%),2)+RIGHT$(STR$(D%),2)+RIGHT$(STR$(Y%-19
     00),2)
1640 RETURN
1650 END
1660 SAVE"MESSAGE/BAS"
```

End of Listing for Message Handling article

By Michael Bryce, WB8VGE

Converting the Radio Shack CoCo to 12 vdc Operation

Getting ready for that unexpected emergency

Another article in our continuing series on Emergency Communications

There you are, sitting in front of your CoCo II™ reading all about the 12 volt conversions for the C-64 by Bob Hoover in the past several months of **CTM**. Bet you're thinking it sure would be nice to operate the CoCo from a battery aren't you? Well let's put 'ol buffalo Bob out to pasture and convert the CoCo!

Getting Started

Well the first things we need is the computer. I again used my CoCo II as the victim. It's a model #26-3026/7. As with the Commodore C-64®, different circuit boards were built for the same model. All are called CoCo II's, but may have a different model number. Check before you begin.

Figure one shows the complete power supply for the CoCo. AC voltage from the secondary of the power transformer provides about 17 volts, center tapped, at 2 amps to the Color Computer II circuit board. Diodes CR1, CR2, CR3 and CR4 comprise a full wave center-tapped rectifier. The output of the diode string provides both positive and negative voltages. The positive voltage is filtered by C2, a 4700 Mfd capacitor. The output of diodes CR2 and CR1 is negative. This voltage is filtered by C2, a 220 Mfd capacitor. This negative voltage is used by the SALT chip. The SALT chip (Supply and Level Translator) takes this negative voltage, regulates it down to -5 volts and then uses it for the RS-232 drivers. Cassette operation will also be affected. One will not be able to load data from the cassette.

The negative voltages produced by the power supply is used only by the SALT chip and then only for the RS-232 drivers and the cassette port. You will be able to save data, but not load data without the -5 volts. The negative voltage *is NOT used* anywhere else in the Color Computer II.

After the positive voltage is filtered by C2, it is connected to the collector of the pass transistor Q1. The SALT chip receives it's power from the same source. The SALT chip internally regulates the positive voltage to +5 volts and provides base drive current for Q1. The current for the computer is drawn from the emitter of Q1 through R2. The voltage at this point is monitored by pin 3 of the SALT chip and the base drive adjusted to keep the voltage at a steady 5 VDC. If the amount of current flow though R2 becomes excessive, pin 2 of the SALT chip will sense it. The SALT chip will then foldback the voltage of the supply by reducing the base drive current to Q1, protecting the power supply.

As you can clearly see, the Color Computer really runs on 5 Volts DC, and nothing more! Now there are two ways to put the Color Computer on battery power. First,

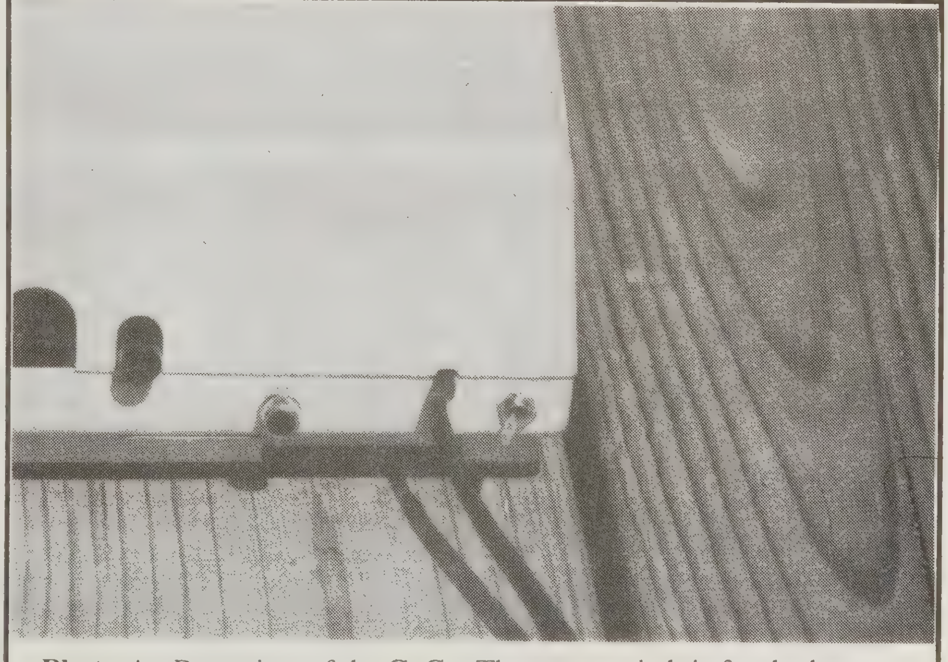


Photo A. Rear view of the CoCo. The extra switch is for the battery. The RCA jack is the 12 volt input.

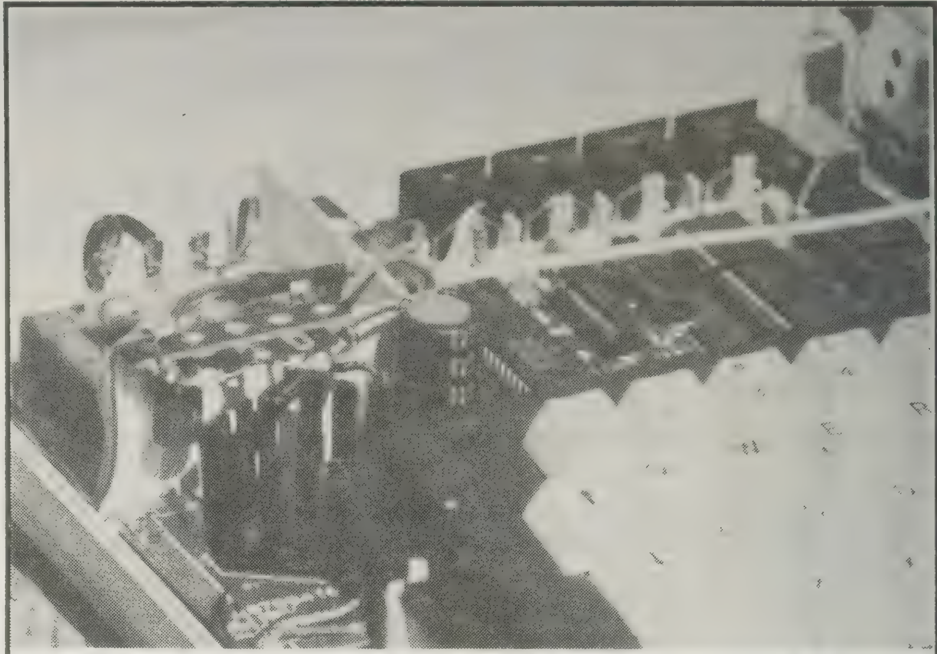


Photo B. Location of the terminal strip holding the diodes for the conversion.

you could supply +5 volts to the main computer circuit, bypassing the power supply all together. Or second, bring in 12 volts to the CoCo's supply and let the it provide the needed +5 volts to the main circuits. This way, we still retain the over voltage, over current protection that is supplied by the SALT chip.

Plug in the soldering iron, grab a screwdriver, we'll convert the Color Computer over to 12 volt operation faster the Buffalo Bob can say "Kaypro!"

Figure two shows the required circuit. I used two, 2 amp diodes in series along with some de-coupling capacitors. In my shack, the 12 volt DC line is connected up to multiplicity of equipment. I have found out that the de-coupling capacitors are needed to keep critters off the supply lines.

The two diodes supply three different functions. First, they provide a means of isolating the 110 volt AC supply from the batteries. This means you can connect up the batteries and operate the computer on the 110 mains at the same time. Try that one on for size Bob! By reverse biasing the diodes, the computer's power supply will not feedback into the battery. It would be possible to actually recharge the back-up battery supply, but that would be over-tasking the already maxed out supply.

Since we only need +5 volts to operate the computer, by suppling the regulator with 12 volts, the regulator has to drop the voltage. Where does the excess go you ask? Why into heat. The power supply in my Color Computer already runs two levels up on the warm side, so I installed an extra diode. That way I now have about a 1.5 volt drop across the diodes. The input of the SALT chip will see 12.6 volts, minus the voltage drop of the diodes, or 11.1 volts. Now the power supply will run cooler on 12 volts DC than on the 110 AC mains. As a side benefit, you can run the battery voltage down lower and still operate the computer.

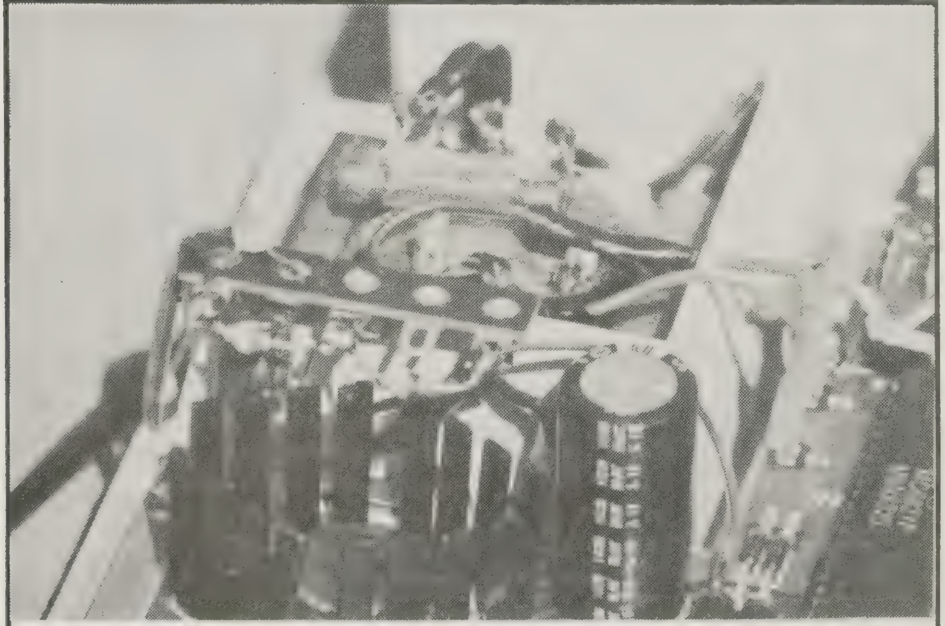


Photo C. Close up of the diodes and the terminal strip. Notice the de-coupling capacitors on the far end of the strip. The diodes are rated at 3 amps each.

Third, the diodes provide for reverse polarity protection. If you would connect up the battery backwards, the diodes will not conduct, thus protecting the main computer circuit board.

Start the conversion by reading the following: Neither myself nor **CTM** assume responsibility for the conversion. You will be making solder connection to the main computer board. If you feel you're not up to it, best not to start. Employ someone who feels comfortable working with computers to do the conversion.

The Conversion

Open up the case and separate the top half. Sit it aside. Notice the 110 power transformer. The inside plastic wall (the one that is pointing toward the heatsink) is where we'll mount a terminal strip. This strip will hold the diodes and the capacitors. I use an old soldering iron to melt a hole through the plastic and then use a 6-32 screw to fasten the terminal strip. Wire the diodes, capacitors to the strip.

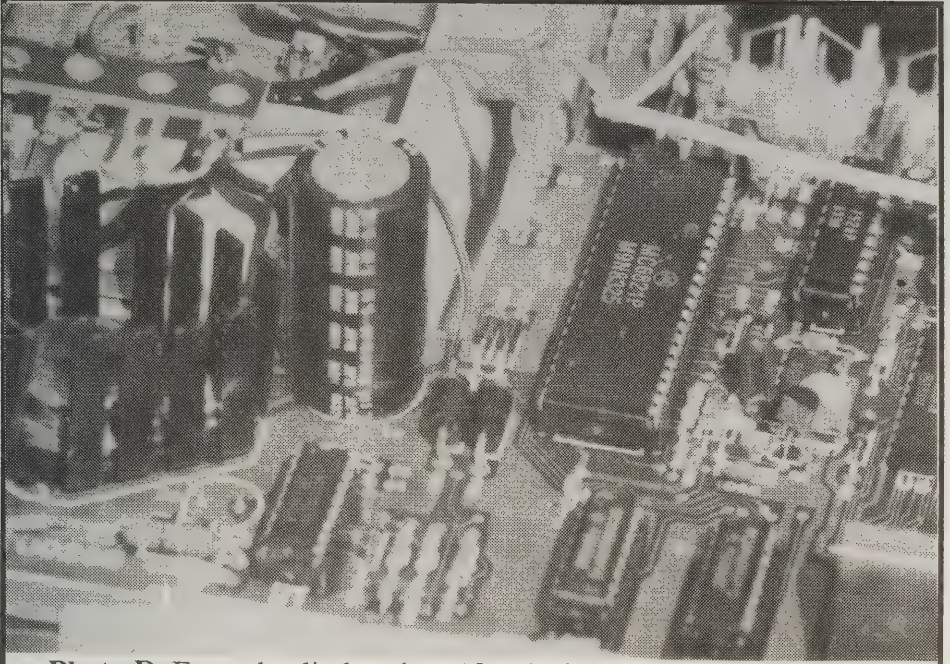


Photo D. From the diodes, the +12 volts is then connected to diodes CR3, CR4 on the banded end of the diodes.

From inside the transformer compartment, melt a second hole and install a small SPDT switch. Use the micro-mini type sold by Radio Shack or your favorite surplus junk dealer. I mounted mine on the left side of the computer, as you look down into the main circuit board. I did get a bit sloppy with the power connector, I used a RCA phono jack. I did plan to change the power jack over to one of those fancy coxial types, but never got around to do so. It would probably be best to use something other than the RCA jack. I'm not to worried about the voltage drop, just neatness and safety. From the connector, solder the negative wire to the ground mask on the top of the circuit board. This is the ground foil that goes around the edge of the board. Make a good, solid connection. The positive wire goes through the switch, to the terminal strip. From the last diode, a wire is then soldered to the banded end of diodes CR3 and CR4. Use extreme care when soldering onto the diodes. Excessive heat will easily destroy the devices. The best way to solder to the diodes is from the top of the circuit board. Strip the insulation from the end of the wire and tin with solder. After the wire cools down a bit, fashion the end of the wire into a hook. Hook the wire from the top and under the lead of either CR3 or CR4. It does not make any difference which diode, both are connected together. Solder the wire to the diode lead.

Check your wiring very carefully. I don't know of a faster way to destroy a computer than to over-voltage the main board or supply reverse polarity voltage. When you have given things a good look over, flip the battery switch to the off position and connect up the battery. With this modification, the main power switch will not function. It will however still be fully operational when the CoCo is operating from the 110 AC lines. You may leave the main power switch in either position while running from the batteries, it makes no difference in the operation. Turn on the battery switch and you should see the sign-on message on the monitor. The Color Computer II is now running from a 12 volt DC supply. The computer will draw about 300 milliamps from the battery.

Packet Back-up System Now

If you have a packet station on the line 24 hours a day, you may like to give this a try. Connect the Color Computer to the battery supply and also to the 110 volt AC mains. Turn on the computer via the normal power switch. After you have the computer fired up and running, throw the battery switch to the on position. If you have installed the diodes as I told you, the battery will not affect the normal operation of the computer, even though it is connected to the power supply. If during the course of the day you should lose normal 110 volt power, perhaps during a storm, the battery bank will take over the operation of the computer

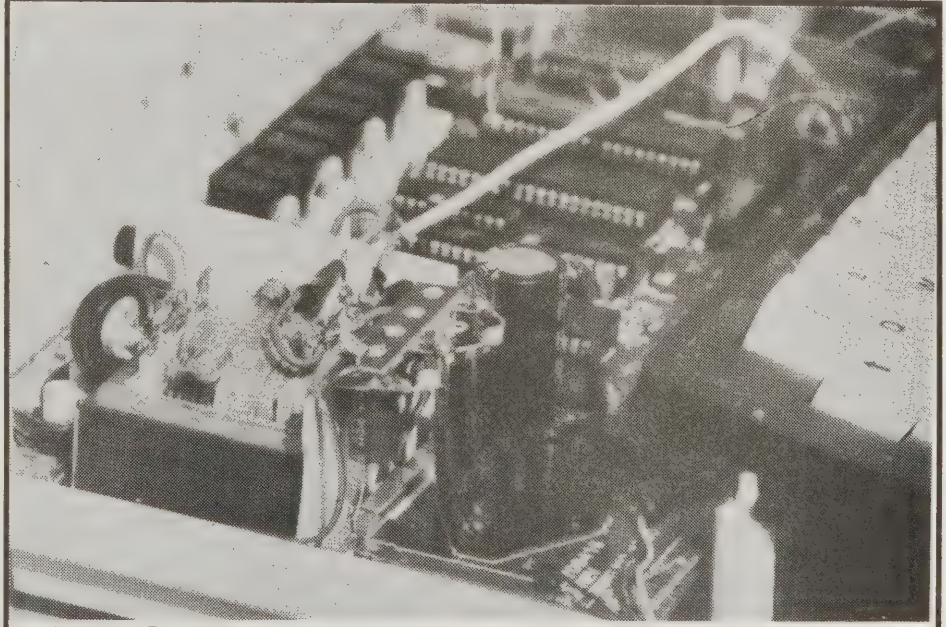


Photo E. Different angle of the terminal strip mounting. The large heat sink is for the pass transistor used in the power supply. The large capacitor is for de-coupling of the 12 volt line.

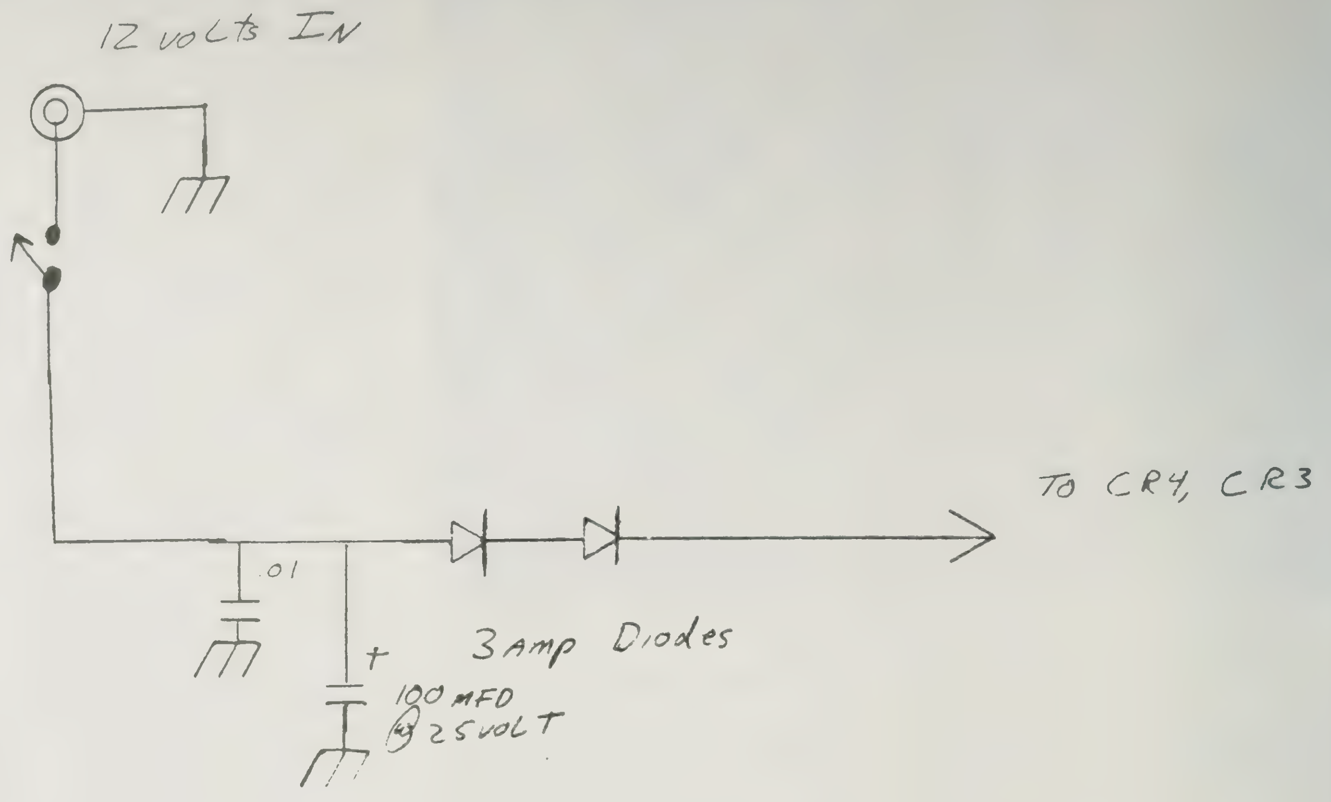


Figure 1. The wiring for the 12 volt conversion, main board.

instantly without missing a bit of information. Try that one on for size Buffalo Bob!

Loading a program

Now that the Color Computer II is operating from 12 volts DC, how about program loading and saving? I left this area somewhat confused. Without the -5 volts on the power supply, we're unable to load data in from the cassette. Cassette storage sucks, so why worry much about it. On the other hand, cassettes prove very useful as a lot of data can be stored on one. For emergency power/disaster use for packet communication I just use the deluxe RS-232 pack with it's build in program. Remember, since we don't have the -5 volt supply running, we don't have the RS-232 drivers working. The "bit banger" port on the back may or may not work correctly while the CoCo is on battery operation. That will depend on the software being used. That's not much of a problem, as long as we use the program pack. We can build up a small 555 timer circuit that would produce -5 volts for the RS-232 drivers, and maybe I'll do so at a later date, but for now, I'm not worried too much.

Converting the disk drive

We can't live by cassette tape alone! So how about converting the disk drive to 12 volts? Well as ALF would say, "No Problem." Lucky for us, most of the CoCo's disk functions are handled by the controller pack. This pack contains the DOS and the needed circuits to run the drive. All that is inside the CoCo disk drive is a disk drive and a small power supply. Conversion over to 12 volts could not be easier. Open up the drive case and you'll notice a small circuit board and a transformer. That circuit supplies 12 volts and +5 volts for the drive. The power supply simply plugs into the drive. You can either make up a separate plug or you can purchase one from you local computer hacker. Figure #2 shows a very simple circuit that will drop the battery voltage down to the needed +5 for the drive. Using only one 7805 regulator chip and a handful of capacitors. Again, I used a diode in line to protect the drive from reverse voltage damage. Also, install a switch to shut off the battery to the drive. Even though the drive may not be running, there is considerable current draw. Stepper motors are turned on and the drive's circuits are operating. Yes, you can turn off the drive and still run the computer. The CoCo will not know the difference, unless you try to access the drive. Connect both the input to the regulator and the 12 volt feed to the drive together. The plug will then be wired to the regulator. Double check the pinouts of the normal supply so you know which pin is what and wire up the second power cord. 99% of all drives use the same pinouts for their power needs. *Check first to be sure.*

With the new cord plugged into the drive, connect up the battery. Turn on the computer and then the drive. Place a formatted disk in and ask to see the directory by typing

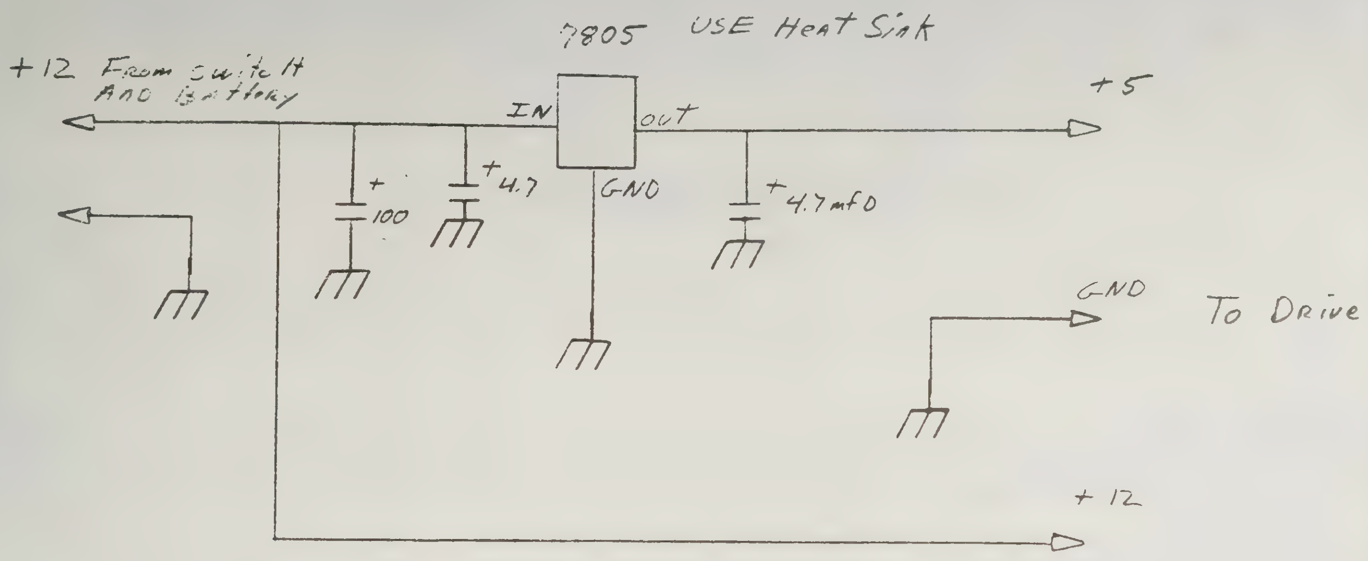


Figure 2. Wiring for the disk drive. Remember, you'll need to use a "Y" cable with the drive to operate the RS-232 pack. Check with the ads in **CTM** for the proper drive power cable. Should run about $3.00 or so.

DIR. You should see the red LED light come on and hear the drive spin.

Remember, to use the RS-232 pack with the disk drive controller, you must use a "Y" cable. You could of course use the multi-pack interface, but that would have to be wired for 12 volt operation as well. It is much easier to just use the "Y" cable.

I don't really care for the idea of using the original Radio Shack drive. I feel uncomfortable with cutting holes in it's case. The need for a second, portable drive comes clearly into my mind. How does one go about getting that portable drive you ask? Well all one has to do, is find a computer hacker, you know the type, and find out if he is "into" the MS-DOS computers, the big blue types. Odds are he is. Now tell him you were watching the CBS evening news with Dan Rather and there was this story on some computer hackers coming down with some God awful disease that was killing them off like ten pins. Researchers traced the cause down to full height disk drives. Mention the fact that you know the one sitting on his shelves You'll be glad to take it off his hands for $5.00. He'll jump at the offer, hackers are not awfully bright when it comes to such matters.

Now that you have the drive in your hands, what do you really have? Could be several different critters. What we need for the CoCo is only a working drive. Since RS-DOS will only support one sided drives, don't worry about using the double sided MS-DOS drive, we'll just use one side.

It's beyond the scope of this article to give complete directions on the use of third party drives on the CoCo. All we need is a 6ms seek time (most are) and the proper jumpers set in place. It makes no difference the type of drive (with some exceptions, no 1.2 meg jobs and forget about 8 inch drives also.) I picked up at a local hamfest a 96 TPI drive, new, in the box for $5.00. The guy told me that they would NOT work for an MS-DOS machine. I went home, plugged in the drive to the controller and formatted a disk. Oh sure, I had to play with the jumpers a bit, and if I screwed up, I could have smoked the drive, but thats life. What I ended up with is a second drive that reads and writes data in it's own little world. I can't read data in from my real CoCo drive, and the real CoCo drive can't read the data from the 96 TPI drive either. I DO have a very good emergency powered disk drive for the Color Computer though! By coping what I needed from the real drive over to this critter, I have all the programs I need. I added the power plug cable to the new drive. Built and installed the regulator board, and was on my way.

I found that this method is by far the easiest, fastest way of placing the Color Computer on battery power. We now can operate the computer, load and save data on the disk drive, all while miles from the power grid lines.

Most people read a article over several time before they pick up the tools. I hope you do the same for this article. There is a fine line to be drawn here. Do you want a portable computer system to setup in times of emergencies. To have the power to communicate with high speed data such as packet radio when citys are plunged into darkness? Or, do you want to play space invaders at the family picnic?

Without the -5 voltsupply, we lost the cassette storage and the

By Judy Muir

Let me tell you about my "Timex Take Along"

(**WARNING!!** Please don't try this project unless you are willing to risk damage to your valuable TS1000 or ZX81. I have a couple extra on hand in case it happens to me.)

Hi Timex Sinclair Friends,

My name is Judy Muir, I am the coordinator for the T/S SIG for WCUC (Westmoreland Computer Users Club) in southwestern Pennsylvania. I write the BiT/S in PCs for the *User Amuser*.

This SIG was started over a year ago by Ralph J. Vasko and myself to fill a void, the void created by the other T/S SIG to which we belong, The Pittsburg Area Computer Club (PACC). Their T/S SIG is mainly involved with the QL, TS2068 and CP/M and not interested in the smaller units.

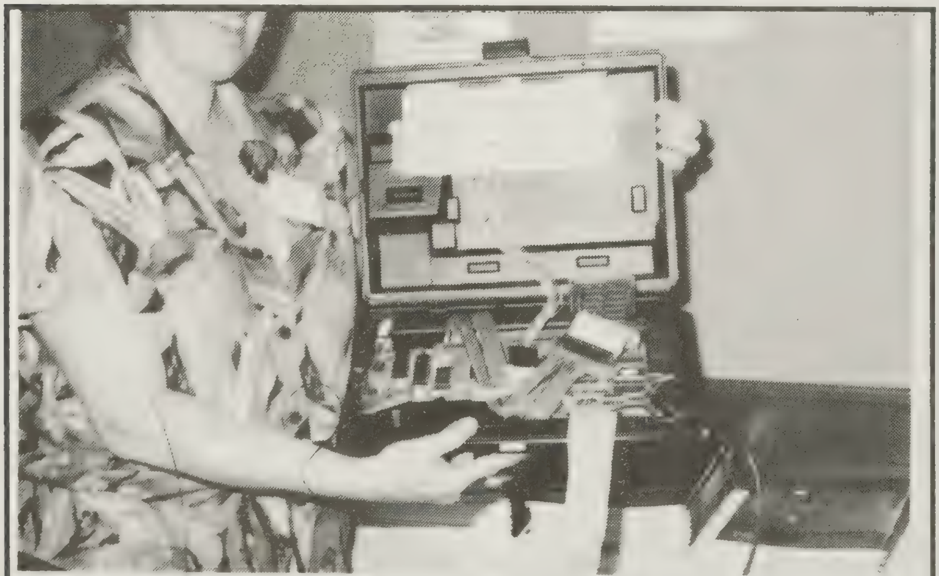
Seeing the potential and the reliability of the smaller units we sought others of like attitudes. Having been introduced to both clubs as a result of computer shows in local malls, we were welcomed by the WCUC to fill a reciprocal need. They needed groups other than Commodore involved in order to help get nonprofit status. We needed a meeting place and help reaching T/S users. Funds were made available (which we didn't need) as well as a regularly scheduled meeting room.

After several months of advertising the new group with limited response, my spirits were fading. Where were the enthusiasts?

I was ready to give up on the idea. Ralph had his work schedule changed and would not be able to help out at the meetings with the T/S SIG. It also meant that I had to help out more with his editor's tasks. Ralph is Editor for the *User Amuser*, the WCUC newsletter. But remembering the advise given us when we approached the club, "Even though you may be discouraged, hang in there, the next meeting may be the one to get the club off and running". Oh well, what is one more meeting of setting in an empty room talking to a stray person that might stop by, I have the computer with lots of projects to keep me busy.

Being an early bird, I arrived to set up equipment and get started. Well! What did I find but people actually waiting for the Timex Sinclair representative to arrive. Not only that but more came shortly thereafter. I don't mean to mislead you, from the original dozen we have about half that many dedicated members, and they all want to work with the ZX81 and the TS1000.

Enough background, back to the main subject of my **"Timex Take Along"**. Since our expertise is way behind most writers for **CTM**, we can benefit greatly form your knowledge. As a group project, we rewired TI keyboards for our TS1000's.



Part of Judy showing her "Timex Take Along"

Timex Take Along

The recipe

The recipe is as follows:

Take 1 TI (Texas Instrument)

keyboard

Cut a few traces

Solder a few little pieces of wire between random spots

Fasten some diodes and transistors

Plug in

Sounds easy doesn't it? It only took us 3 months.

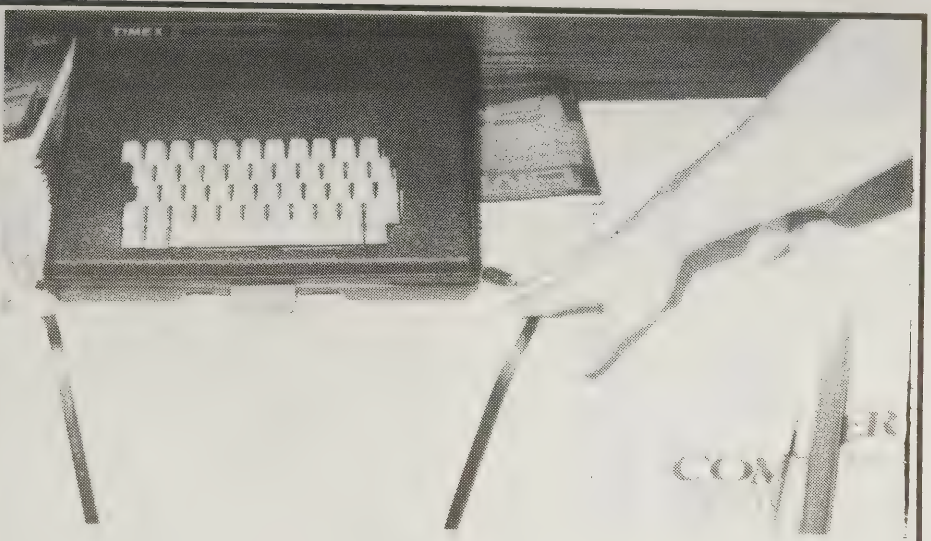
When you get several novices together it takes longer, but we are learning. So far we have learned, if you use too much heat the solder will run through to short the contacts inside the switch. To correct this problem we were shown how to use multi strand wire as a wick and pull the solder out of the switch. Also if you press too hard when melting the solder on a terminal you can press the wire right through and it won't make contact. This may lead to connecting a jumper you didn't intend to use.

I have come up with many other hints on doing your own keyboard. Make sure it is a TI replacement keyboard, I haven't found any other to be easily adaptable. Radio Shack sells others with membrane connector strips, you don't want that kind.

The ones currently available don't have the name of the keys on the trace side of the board. Take time and mark them. Use a schemetic to figure out on paper what should be connected together and where to cut and where to connect.

Several methods of cutting the necessary traces are; scrape with a knife, use a drill larger in diameter than the traces (DON'T go all the way through). The best method I found is using a cutoff disk on the Dremel Tool. Always work in an area of the board with as much room as possible so you don't cut something you shouldn't. Work slowly. Check, recheck and check again. Test each cut to be sure the trace is broken, looks can be deceiving. Use a tester to make sure.

When soldering, hold the wire with needle nose pliers, it gets hot. Don't use any more solder on a connection unless needed. Don't heat too much, nor press too hard. Strip the ends of the wire just enough for good contact, about 1/8 inch is enough. Tin the ends, by coating with a glase of rosin core solder, just enough that you see the color or shine, then attach to the correct terminal.



Judy's Timex Take Along in case. Photos taken at the recent T/S Computer Fest.

Now comes the diodes. The instructions I used from *Sum Magazine*, told me to use 1N914 diodes. About a dozen for each keyboard (2 for each special key). The keys that require shift and another key are an example of the special keys. I chose to have on my board a one key delete beside the zero, a one key "beside the P, a one key; beside the L, a separate period key, one key function, and a separate edit key between the alpha lock and the space, which I also connected.

The way to connect these keys is simple, now that I understand the instructions. Each key requires a combination of a keyboard line and a diode line. All of the single keys I mentioned have one line in common, either the keyboard line or a diode line leaving two of the other to be connected.

For example the delete key is the zero (K0,D3) and shift (K0, D6) and shift (K),D6)) you have two K lines that need diodes. With this the colored bands should be closest to the terminal. The diodes will only let the current go one way.

In studying the circuit board it appears that the diode lines are on the left terminal and the Keyboard lines are on the right. This can help in working out the extra keys.

The 2N2222 transistors, haven't worked yet for the one key comma, when put in as directed. What I currently have is a comma when I press comma and period simulataneously, not one before the other.

Several of these keyboards are in operation and working well. These instructions may seem much too detailed for some of you while others may think it's too difficult. I am by no means an expert but I accomplished the project, so can you.

I've made a wooden case for one of mine, while the other, my "Timex Take Along" is a portable unit to use for meetings.

For about $10., I purchased a brief case specially designed with the Timex Sinclair name on a sloped front, with a tuck away handle and loops for a shoulder strap (which I use). By using white out to mark the outline of the keyboard (just large enough for the keys to clear) and the previous mentioned cut off blade, the hole is cut in a jiffy. Since there is an inside layer designed to hold the computer and accessories in place you must cut some of it as well. Don't cut away anymore than necessary. This layer is needed to

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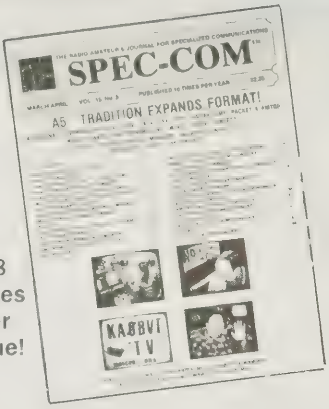
5% Added



fasten the keyboard in place. I used 3/4 inch screws and washers as spacers to evenly mount the board. The screws will form threads in the plastic liner, so don't tighten too much or you won't have any gripping (the threads will strip). There isn't room to use bolts and nuts which would hold better.

In order to have outside connections for the cables as well as being able to use the 16K memory pack, it was neccessary to remove the modulator from the circuit board. With the case open in front of you, place the modulator at the left rear, with short wires connecting it to the original terminals on the uncased computer immediately in front of it. All wires come out the left side of the bottom half of the brief case.

To locate the holes, I just determined the thickness of the case and added the distance to the socket center. Make the holes fit the outside of the sockets snugly. Drill slowly, use a round file if hole needs enlarging. Work slowly!

You now have enough room to mount the memory pack (uncased) to its usual place on the circuit board.

All that remains at this point is to connect wires from the circuit board to the keyboard. Since the original keyboard was defective and the case wasn't being used, I also removed the keyboard sockets and attached the wires directly in the holes where the socket had been mounted. I used 22 guage multi-strand wire, which is almost too heavy but I didn't have a problem with the shifted A,S,D or F which sometimes occurs when adding a keyboard to these computers. It is harder to work with heavier wire but it can be done.

To my "Timex Take Along", I've added my Larken disk interface board. Yet to come are the repeat key circuit, 64K expansion, individual direction keys (I can't find a small enough joystick that would look good on the outside of the case). Why not battery backup and an Epson super twist screen?

I can dream can't I?

Keep computing...
Judy Muir
108 Short Street
Forbes Road, PA 15633 **CTM**

(Judy, thanks for the fine article and please send in more... when you have the other modifications completed...Chet)

Continued from page 47

Without the -5 voltsupply, we lost the cassette storage and the RS-232 bit banger. I'm not worried about not have a printer running from that port. With disk storage, why mess with the cassettes?

With the Color Computer on battery, I can do everything I want to do, and when the lights go off, I'm still computing, still communicating, and that my friends is the bottom line.

Michael Bryce, WB8VGE
2225 Mayflower NW
Massillon, Ohio 44646 **CTM**

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By Bob Slaughter

Remote Bulletin Board Service

and How to Live With it! Part II

Wow! This is great! I can actually get ON-LINE with my computer and talk to another computer. This has opened up a whole new and fascinating world that is so exciting that I find myself up till 2 and 3 o'clock in the morning trying to call bulletin board systems. I am now apart of the IN crowd!

I have just called in to ProSoft Systems BBS and I think I will leave Chet Lambert a note about how great the CTM Magazine is. This should be simple, right? Wrong! To my great surprise the text editor for the BBS seems to be somewhat short of a Word Star or Word Perfect processor. Not to fear, if Chet can do it surely I can. (By the way, Chet is still in school on this editor.)

Well, lets take a test drive through sending a message and see what all is involved.The first thing to do is enter an "E" from the main menu. Then you will get the prompt:

To: *[C/R]=all?*

The system is asking for the name of the person I am sending a message to. "[C/R]" stands for Carriage Return.To press the "ENTER" or "RETURN" key would address you message to anyone that wants to read it, or in other words, a PUBLIC message.

Next you will get the prompt:

Subject:?

This is, as you would expect, the subject of your message. If you enter this blank it will abort the message. This subject also sets up a linked chain so that multiple messages that all relate to the same subject can be read in succession by using the Read sub command "THREAD". For now, I'll enter the subject that I wish to address which is "CTM MAGAZINE".

The next prompt you see will be:

Security: [G]roup, [R]eceiver, [S]ender, [H]elp, [C/R]=None?

It seems that a little explanation is in order at this point. What do these options mean? You can get HELP with these questions by entering "H" at this prompt. If you do so you will see a screen that explains each option and its intended use.

[G]roup option:
allows you to set up a password that only a specific group of people know and only they can read or Kill that message.

[R]eceiver option:
allows only the person addressed to read or Kill the message.

[S]ender option:
generally a public message that can be read by anyone but only the sender can Kill.

[C/R]=None option:
hitting the "ENTER" or "RETURN" key will make it a public message that anyone can read.

In this case I want to send a public message so I simply hit the "ENTER" key. Next you will see:

To: [C/R]=all? CHET LAMBERT
Subject:? CTM MAGAZINE
Security: [G]roup, [R]eceiver, [S]ender, [H]elp, [C/R]=None?
Enter your text. [C/R] alone to end. (72 chars/line, 19 lines maximum)
[--]
1:

At this point you can start entering your message. Just start typing your message without concern for the end of the line or splitting words. The system will wrap your words to the next line, if needed, as you type them. This all seems pretty easy and it is, until you make a mistake in your sentence or your spelling. Then you have to EDIT your message.This is not nearly as complicated as it appears, if you will take your time and read the helps that are displayed.

Inserting and Deleting lines are straight forward commands Enter "D;2" if you want to delete line # 2 or "I;3" if you want to insert a line BEFORE line # 3. If you enter either command by themselves such as "D" or "I" the system will prompt you for the line number. Once the command is entered the prompt will be redisplayed and, in the case of the Delete, display the line specified and ask for confirmation of the requested function.

The real tuffie seems to be in understanding how to modify the text on a given line or inserting a word in a line or correcting the spelling of a word. Here's how it is done Suppose that you have entered the following lines:

1: Hello Chet. I thought would drop you a line to telll you how

2: much I enjoy the CTM Magazine.

I left out the word "I" between "thought" and "would", and I misspelled the word "tell". To correct this problem is really simple. First I enter "E;1" to tell the BBS that I want to EDIT line #1. The BBS will display line # 1 followed by

Enter [Oldstring;Newstring], [C/R]=no change.

?

Here it is important to remember that "Oldstring" MUST be an exact match of some consecutive word or group of words in that line. The BBS will search the line for the "Oldstring" expression and RE-PLACE it with the value that you enter for "New-string". These two values MUST be separated by a SEMICOLON (;). Therefore to correct the errors mentioned above I would enter:

? thought would;thought I would <ENTER>

At this point the BBS would display line 1 after making the correction and it would look like this:

1: Hello Chet. I thought I would drop you a line to telll you how

Enter [Oldstring;Newstring], [C/R]=no change.

?

If I were through I would press <ENTER> without typing a value and the line editing process would terminate. But I still have a misspelling to correct so I enter:

? telll;tell <ENTER>

1: Hello Chet. I thought I would drop you a line to tell you how

Enter [Oldstring;Newstring], [C/R]=no change.

?

Now press <ENTER> to stop the line editing and you will see:

[A]bort, [C]ontinue, [D]elete, [E]dit, [H]elp, [I]nsert, [L]ist, [S]ave

CTM Conference Message Entry Command?

You could enter "C" to Continue your message or if you were through you could enter "S" to Save it. I have completed the message I started here on the BBS. Should you call in and be registered in the CTM Conference you can see the following message # 73 just as it appears here:

```
Date: 06-22-87 (23:02)     Number: 73
To: CHET LAMBERT           Refer#: None
From: SYSOP                Recv'd: No
Subj: CTM MAGAZINE         Sec'ty: Public Message
```

Hello Chet. I thought I would drop you a line to tell you how much I enjoy the CTM Magazine. I find the articles informative and the illustrations delightfully well done. I know that it takes a lot of time and effort to put together the QUALITY publication that you do. I think that you deserve some special recognition for the contribution that CTM makes to the Ham Radio Community.

God bless you my brother and keep up the good work.

Bob Slaughter
--==:(SYSOP):==--

Keep in mind that should you get a line so messed up that it seems impossible to correct, it may be simpler to DELETE the line and reenter it. The message base provides an excellent tool for communicating with folks that you need to contact without requiring both of you to be at the phone at the same time. There are folks that I exchange messages with that I would otherwise never communicate with for weeks or months at a time. It helps me stay in touch.

Please feel free to call in and try your hand at leaving mail for a friend or an associate. Should you have any difficulties you can leave me a Comment through option "C" on the Main Menu.

Sorry, but if you do that, you still have to use this same Glorious Editor. The good news is that ONLY I will be able to see any mistakes that you make where otherwise it might be open to the 600 + other registered users of this BBS.

Bob O. Slaughter
President
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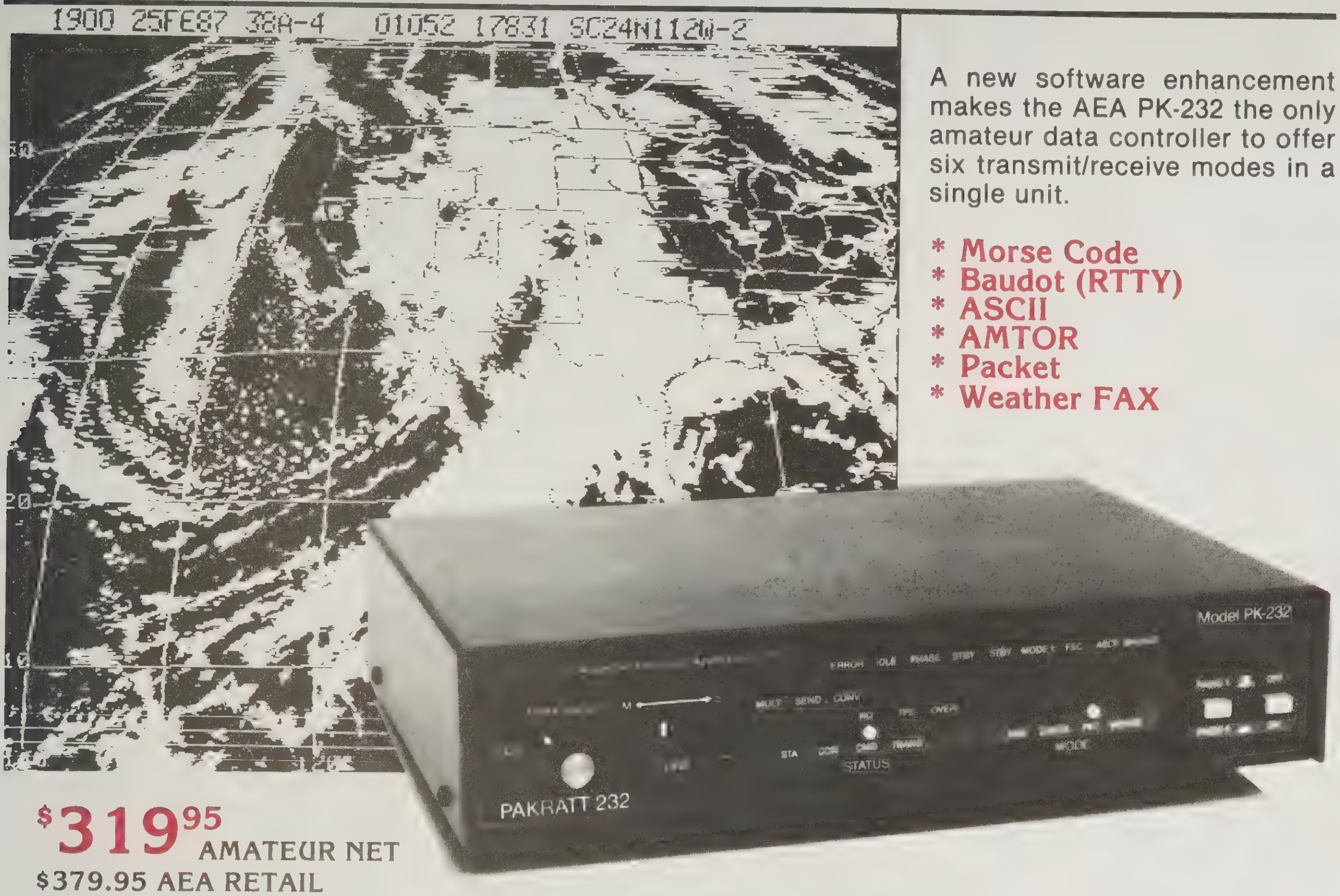

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By Jet Thomas

The PC8300

A T/S 1000 Clone

Last month I bought a PC8300. I wasn't sure why I was doing it, I saw a little magazine ad that offered it for $30 + $6 shipping. For 4 times the money I could get another Sinclair QL which is a lot more than 4 times the computer, but I wanted the PC8300 and I didn't know why. Finally I bought it to find out.

The PC8300 was advertised a TS1000 clone with a real keyboard. I was excited when it came. It's bigger than a Timex, about the size of a TS1500 and with the same sort of big chicklet keys. The case is cream-white and the keyboard is green. It has both monitor and TV lugs and a joystick port. There's a speaker grille in the bottom of the case. I looked at the instruction manual, and it was in Chinese!

The speaker gave a different tone every time I pushed a different key. It sounded like CLOSE ENCOUNTERS THE THIRD KIND. Most of the one-stroke commands were gone, and the ones that were left were moved around on the keyboard. It had 2 shift keys and a RESET key. The Reset key pressed once would stop a basic command in midstream, and pressed twice cleaned the memory just like unplugging it. Shift-space was the old Basic Break. There was a key to turn on auto-line numbering. The gray graphics characters were replaced with triangles, and there were 4 arcade-type symbols. It was just like a TS1000, except done a little bit better, and without the one-stroke commands. I still didn't know why I was excited.

The manual was mostly a direct translation into Chinese from the original Sinclair manual. The programs were in Basic, of course and from them and the diagrams, it was obvious that there wasn't much new in it. What was new was the BEEP, SOUND, and MUSIC commands. These were easy to figure out from the examples. MUSIC has 3 octaves, you get the low octave by putting a '<' behind the letter and the high octave with a ">". You sharp a note by printing the letter in inverse mode. TEMPO affects the speed, and there isn't any way to make it louder or softer. It's pretty much comparable to the equivalent commands from IBM PC. You can't make good music from it, rather, like the singing dog, the marvel is that it can sing at all. I still didn't know why I was excited. If I could get one for $5 with battery backup, I'd use it to water my plants or something, but at $36 it a relic.What was I missing?

I took it apart. There were 3 little screws in the bottom front. There weren't any under the rubber pads. It didn't want to come apart. Eventually I found the 4 snaps and forced them open. The case snap together, which would probably be a bad thing if I wanted to take it apart over and over. Or maybe I'd learn how to do it easily. Inside, the first thing I noticed was that the keyboard ribbon connector was a real wire ribbon that was soldered to the boards.

You can't take the top all the way off. But it was long enough to lay the top out of the way. I had mixed feelings about that. The plasic ribbon cables always caused trouble, and they could always get fixed.This looked like less trouble but it would be less controllable too.You don't just plug in a new keyboard or special-purpose device here. Then I noticed the heat sink. It ran across the back of the case, from one end to the other. It was BIG. They'd looked at the ZX problems, and corrected them. The circuit board was larger, and the traces were farther apart, and most of the little resistors and capacitors were gone. It looked like a simpler setup, and it would definitely be easier to make changes on the circuit board, noticing that the simplicity didn't reduce the flexibility too much. So all in all, the thing is a perfected TS1000, in a world that doesn't seem to have any place for a perfected TS1000.

So why was I smiling?

I looked at my PC8300 and realized that I understood it. It's all simple. I don't really know the circuit diagram, but I know what it does, and the external bus is the same as the TS1000, and I could trace out what ever I wanted in a few hours. I don't understand the keying that lets you type

PRINT or shift-Z to get PRINT

on a program line, but it's probably even simpler than the original. They had to find the space somewhere to put those sound commamds in the same old 8K ROM. It took me using spare time, 2 months to learn the TS1000, including 3 weeks to learn Z80 assembly language on it. Then I could understand anything it did. When you think about it, a computer that's simple enough to really understand is pretty remarkable. People who learned the IBM PC in theirs spare time usually got good at DOS 2.2 just about the time that DOS 3 came out, and got comfortable with the hardware last month. The new machines are set up with the idea that you'll use them without understanding them. You don't learn how they work less you're a technician who's paid by the hour to use your skills. So you run software you don't understand on a machine you don't understand, and if it doesn't do quite what you want or if it doesn't do what it claims, you shop around for something else or you tell the software company and maybe they'll make improvements in an updated version.

Even the Sinclair QL is too complicated to understand easily. They did their best to make it simple. Every external device gets its own device driver, and the I/O to it is supposed to be in a standard format. You can treat all the devices the same, so long as their drivers work. They set up one routine to make LISP-type linked lists, and anywhere they want a linked list, they use the same routine. The list of external interrupt servers works the same as the list of device drivers and the list of open files and the list of screen windows.

There are lots of such routines set up in tables which are the equivalent of the PC BIOS, so that if they (or someone else) reorganize the ROMs then the old software will all still work, provided that the new routines in the new locations still perform the old functions under the old circumstances. But there's still so much of it! The extra trouble you get with extra complexity is usually supposed to go up exponentially, with a mantissa around 3. That is, twice as complicated is 3 times the trouble, 3 times as complicated is 9 times the trouble, 4 times as complicated is 27 times the trouble, and so on. I think the QL isn't on this scale. It's more like 10 times as complicated and only 10 times as much trouble to learn. In return for the complication and trouble, you get fully buffered interrupt-driven serial ports, and fast mass storage, and lots of other nice things. But it does require that extra effort to understand....

Then I knew why I liked the PC8300. It's the same reason so many Timex users are still finding uses for a 'toy' computer that's been out of production for years. I'm sure it's the reason Commodore users keep buying disks and hard disks and such, when for the same money they could buy much more sophisticated hardware. I wouldn't be surprised if the next few years, we get a collection of die-hard IBM-PC users who almost understand DOS 3.3 and who won't want to switch to something new and proprietary. What it means is that we need a way to reduce computer complexity to manageable levels. The QL does it better than anything else I've seen but it still isn't as simple as we want for hobbyist purposes. A good language would help, but I haven't seen a really adequate one yet. **Forth** includes some good simplifying techniques, but it's mostly for personal use. To understand someone else's forth programs you need to be exceptionally good at the language, although to use it yourself you only have to learn the parts of it that you need at the moment. **C** has all of Forth's disadvantages plus it's "brittle". **Lisp** lets you take a simple concept and complicate it beyond all recognition. I haven't seen a good simplifying language yet.

I felt really happy playing with my PC8300. It won't do that much, but I know exactly how to tell it to do what it can do has fixed all the old TS1000 annoyances: I can hook it up to my $100 monitor and there isn't any RFI junk on the screen. The heat sink is more than adequate. The keyboard is overkill. If I miss a key it doesn't beep. If I used it enough, I'd start noticing the different beep when I hit the wrong key. It has a little red LED "on" light. If I could have gotten this for $36 back when I bought my last TS1000 for $20 I'd have gotten 3 of them. Now I'm sitting here feeling this incredible sense of nostalgia. Those really were the good old days.

The PC8300 will run TS1000 Basic programs, but it won't run machine language programs that use the TS1000 ROM, and it won't read other TS1000 machine language tapes without a little bit of modification. Some of the Basic keywords got switched around, so it switches them back reading and writing tapes, which plays hell with the ML codes. If you'd like to get on my nostalgia trip and order a PC8300, they're available from American

Forign Components
62 Joseph St
Moonachie, NJ 07074
phone 1-800-524-0890
telex 669234; answerback AmerUN

Their 1986-87 catalog has lots of fans, switches, ICs, motors, pumps, and so on. They have lots of surplus computer gear, including Adam and Pc Jr junk, and disk drives. The prices I knew how to check looked about average for June 1987, but fantastic for 1986. Call for current prices on whatever you need. **Tell them you read about them in CTM!** It would be good for them and good for **CTM** and good for you if they advertised here, but they might not know that yet.

I have my PC8300 sitting on my living room table now. I can't say I'm using it much, but every time I look at it I feel good again.

Yeah, those were the days.

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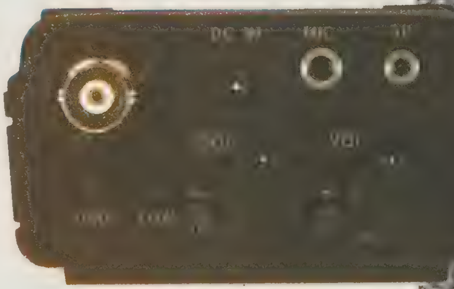

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By David L. Reasoner, N4KTY

PACKET Mysteries Explained!

Being a potpourri of of various and probably useless information about packet radios darker side along with some tips to make the hardware work better

NRZ Vs. NRZI

One cannot read very far into packet literature without encountering "NRZ" and "NRZI". These refer to schemes for encoding digital data for transmission at the physical layer level. **Non-Return-to-Zero (NRZ)** is used for transmitting data around inside the hardware. A low level is a data "0" and a high level is a data "1". However, when you transmit digital data through modems and over radio links there is no guarantee that the phase sense will be maintained. That is, at the other end of the link the "1"s and "0"s may get reversed. A similar problem exists in RTTY transmissions, and there the problem is solved (most of the time) by agreeing that Amateur Radio HF RTTY is transmitted and received on LSB. *But with VHF packet the solution is not so simple,* since different modems may not adhere to the same convention of logic levels. The NRZ code is converted to **Non-Return-to-Zero-Inverted (NRZI)**. Now one might naively think that NRZI is just upside-down NRZ, but not so. I know not how this misnomer crept in. What really happens in NRZI is that the presence of a transition signifies a "0", and the absence of a transition signifies a "1". The absolute level make no difference, only the presence or absence or, not the polarity of, transitions. So after NRZ data is converted to NRZI, it can be transmitted through a network and inversions won't make any difference.

Some hardware/software combinations, like the TAPR-1 and the Kantronics, "speak" NRZI. The TAPR-2 and clones speak NRZ and a big chunk of the TAPR-2 circuitry is concerned with converting one to the other. That 2764 EPROM chip labled "STATE 1.09" is part of a "state machine" which takes the incoming NRZI code from the modem and delivers NRZ plus a recovered clock to the TAPR-2 processors. The clock has to be there so that the processors can figure out where the bit boundaries are and decommutate the data into bytes for eventual conversion to ASCII data for your computer. Meanwhile, the outgoing NRZ is converted to NRZI with a J-K Flip-Flop. In goes NRZ and the transmit bit-rate clock, and out comes NRZI.

Link Equalization

If you own a Kantronics TNC, and if you are like me, you have been mystified by the **"CALIBRATE"** command with all the mumbo-jumbo about twiddling the knobs on your transceiver, selecting **"EQUALIZE ON"** or **"EQUALIZE OFF"**, until the numbers displayed are between 60/40 and 40/60. Here is what is going on. If you put a 600 Hz square wave (50/50 duty cycle) into the input of a modem, that is the same as transmitting a signal of all "0"s at 1200 baud (Remember NRZI). If you now transmit the output of the modem over the radio link, and look at the output of a second modem on the receive end the result will sort of look like a square wave except that the duty cycle will not be exactly 50/50. In other words, the receive modem takes more time to respond to a transition in one direction than the other. This is because the radio link does not have a flat frequency response, but generally the higher frequencies are attenuated. A transition from the low tone to the high tone takes longer to propogate through the system than does a transition from the high tone to the low tone. Engineers call this **"Group Delay"**. Remember that the tones used for 2 meter packet are 1200 and 2200 Hz, and mot 2 meter rigs start to roll off around 2000 Hz. As it turns out, if the duty cycle ratio at the receive end gets much outside of the range 60/40 to 40/60, it becomes difficult if not impossible for the TNC to decommutate incoming packets. The Kantronics TNC uses an AMD 7910 single-chip modem which includes an equalize feature intended to compensate for the characteristics of an "average" transmission link. This feature is switched on and off by the "EQUALIZE" command. So what is going on when you invoke the "CALIBRATE" feature is that you can command your TNC to transmit the aforementioned 600 Hz square wave, or in the "R" position you invoke a software routine that measures the duty cycle of the received square wave and displays it as a ration. The object of the exercize is to fiddle with whatever you have available to make the duty cycle fall in the range 60/40 to 40/60. Since 2 meter trnsceivers rarely have tone controls, about the only thing you can do is try "EQUALIZE ON" and "EQUALIZE OFF" and see which comes closest to the magic 50/50 ratio. Sometimes changing the receive volume setting will make a difference. Obviously this test requires two stations, but the transmitting station can be a TAPR-2 as well as a Kantronics. On the TAPR-2, invoking the "CALIBRATE" command and then hitting "D" will transmit the same pattern as the Kantronics in calibrate mode with the "T" command.

TAPR-2 Modem Calibration

The AMD 7910 modem chip used in the Kantronics derives all the tones from a crystal clock, and there is no need to worry about the actual tone frequencies. Not so with TAPR-style TNCs, which use an EXAR 2206 as a modulator and an EXAR 2211 as a demodulator. The frequencies of the EXAR chips are set by external components and potentiometers (R77, R78, and R79) and they they of course are subject to ageing and drift. I personally have checked about 10 TAPR-2 clones and found the modem calibrations off by amounts ranging up to 10 percent. Now, the TAPR firmware includes a software calibration routine which essentially turns the beast into a frequency counter and uses the CON and STA LEDs as HIGH-LOW indicators. If you have ever used this feature you know that the adjustments are "twitchy", especially the adjustment of the free-running frequency of the EXAR 2211 phase-locked-loop (PLL). If you have access to an audio oscillator and a frequency counter you can set up the modem in record time. Locate the 6-pin jumper JMP9 and connect the frequency counter to JMP 9, pin 6. This is the pin closest to the right rear of the board, and a -5 to 5 volt square wave at the modem output frequency appears at this pin. You might want to install JMP4 (near the RS-232 connector) to disable the transmit watchdog timer. Send the "CALIBRATE" command, and then "K" to key the output. Select the high or low tone by pressing the space bar, and adjust R78 for the correct low tone frequency (1200 Hz for VHF, 1600 Hz for HF) and adjust R77 for the correct high tone frequency (2200 Hz for VHF, 1800 Hz for HF). That takes care of the output tones. To calibrate the demodulator, set the audio oscillator to 1685 kHz and inject the signal into the audio input of the TNC. An easy way to inject the audio is to use JMP 7, the audio loopback jumper, the pin nearest the edge of the board. Locate JMP 8, and remove the jumper. The DD LED will blink at a frequency which is the beat frequency between the audio oscillator and the PLL free-running frequencies. Adjust R 79 until this beat frequency is zero (0), and there you have it! Why 1685 instead of 1700 which is half-way between the two tone frequencies? Well, that is equivalent to turning "EQUALIZE ON" in the Kantronics and compensates for the frequency response of the "average" radio link.

Framing Bytes and Bit Stuffing

The AX.25 protocol specifies that packets begin and end with framing bytes, which are (in binarry) 0111110. The software and/or hardware recognizes this unique code to signal the beginning and end of a packet. However, this particular bit combination may appear in one of the data fields and would falsely signal the end of a packet. So a fix is put in this way. If in a data field five "1s" appear in a row, then regardless of the next bit a "0" is added to the bit stream. This is known as "bit stuffing". Thus, the unique pattern "01111110" cannot appear in the bit stream except as a framing byte. The receiving station knows that five "1s" will be followed by a "0", and throws this extra bit away. Bit stuffing serves another purpose as well. Recall that in NRZI coding a long string of "1s" would result in no transitions. Without these transitions, the receiving station would eventually lose synchronization with the transmitting station, and would not be able to decommutate the data. Bit stuffing guarantees a transition at least every six bits, so that the receiving clock can stay in sync with the transmitter. Incidentally, framing bytes are transmitted during the TXDELAY interval. That is why you hear a change in the sound of a packet about 1/3 second following transmitter key-up. That is the transition from the regular pattern of sequential framing bytes to the quasi-random data fields.

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CTM

FLASH

There is a possibility that CTM may take over PRM Magazine!

I have had a couple of calls lately from concerned Packeteers wanting to know if I was going to take over **PRM Magazine?**

I was first asked this by several at the recent Ham-Com in Dallas, Texas, but at the time I didn't know what was going on.

I had a call a couple of nights ago from Emil Nelson, WB0YID, I think who is head of the Lousiana Packet group wanting to know if I was interested in taking it over if it came available to me? I said yes.

I have been asked by some of the Mississippi group also. Again, I said yes.

I have talked with some of the Georgia group GRAPES, and again I said yes.

I talked the other night to Gynn Ready of *PRM Magazine* who also has PAC-COMM Company. He confirmed that he is giving up PRM Magazine because of lack of time to devote to it as he should. He recently retired from the USAF, and his new compnay PAC-Comm is taking more time than he has.

If you would like to see us take over PRM Magazine, get in contact with your state Packet representative and let them know of your desire. It could be good for us all. I think it would be GOOD TOO! **CTM & PRM** would be GOOD!

By Bill Ford, WB5SXK

An Easy-to-Build Inexpensive Telephone Test Set

Now that the Bell System has been broken up by court order (divesture), things like ordering telephone service or getting repairs is not nearly as easy as it used to be. The local operating company (the folks who have the central office) provide service only up to a specified point at your house or business, called the DEMARC or demarcation point. This is here you connect your inside wiring to the telephone company's wiring. Everything on the telephone company's side of the DEMARC is theirs and everything on the other side is yours. This can get interesting if you have telephone problems. Used to be that if your phone went out, you called repair service, and they came out and found the problem. It didn't matter if the problem was with the wire on the pole, the wiring in your house, or the phone itself. They fixed it. Not any more. You can still call the local operating company to come out and tell you if the problem is yours or theirs, but you will be charged for it! In most cases in excess of $50.00.

One of the things the telephone company uses to check a line is a test set or "buttinsky", this is the telephone with the alligator clips which is used to test telephone lines. Being responsible for a fairly large telephone system at my office, I decided a buttinsky would be nice. In addition to the ability to simulate a telephone, it also includes a monitor function which allows you to monitor things going on the line without loading the line down. This is very useful for monitoring a data circuit of radio remote control circuit without disrupting operation. The only problem with a commercial test set is the high cost -- nearly $200.00. I couldn't convince the boss I needed one that bad.

It became apparent that it might be possible to require a cheap one-piece telephone to use at a test set. I worked on it, and came up with the following.

Getting to it...

First, you will need one of the cheap one piece phones. These are the ones that sell just about anywhere for less than $10, a couple of small switches (Radio Shack sells a pack of 5 mininature slide switches which are excellent for the purpose), and a 1mf 250v capacitor.

Start your conversion by disassembling the phone. Most are held together by a couple of screws beneath the number plate. Remove the screws and gently pry the two halves apart. From this point on, be very gentle with the phone. It is CHEAP, and doesn't take too much to damage wiring or the PC board.

Locate the hangup button and its associated switch. Usually there will be only two connections to it. If there are more than two, you want to find the ones which are connected together when the phone is off-hook (in use). If there are only two wires, you are in business.

Next remove and discard the old switch, and find a suitable location for one of the new switches. On most phones, the plastic button which activates the switch can be removed and the hole enlarged to place it. Connect the two wires which you have previously identified as causing the phone to operate to a SPST (single pole single throw) switch. Once you have done this, plug in the phone and check it out. It should now work normally except that rather than having a button to hang up, you now use the switch.

Next, locate the speaker, and find a suitable location for the second switch, this one will be a DPDT (double pole double throw) and the capacitor. On my set, I positioned the second switch on the upper part of the phone on the side, near the speaker. A hole was cut in the side of the phone for the speaker. I used a pocket knife, but if you have a Dremel tool, so much the better. The capacitor was located in the lower section of the phone in the space vacated by the old switch and secured with a drop of glue from a hot glue gun.

Once you have located a place for the switch, disconnect the wires to the speaker, and reconnect them to the one pair of contacts at the end of the switch. Use some small hookup wire, and reconnect the speaker to the center contacts of the switch. Again, test your set. When the first switch is turned on, and the scond turned to the position which connects the speaker, the phone should operate normally. Mark this position for normal operation. Mark the other as the "monitor" position.

You should now locate the connections for the wire which comes from the wall jack. These will usually be red and green. Connect one end of the capacitor to one of these points. It doesn't matter which. Connect the other end of the capacitor to one of the free contacts on the second switch. Connect a wire from the other line connection to the other free switch contact.

Your conversion is now finished, and you may carefully put the phone back together. If it doesn't work, carefully check the pc board. Remember the phone is cheap, just through normal handling, I damaged two traces on the pc board which I had to repair with wire jumpers!

Now, when the first switch is turned "ON" and the second in the 'NORMAL" position, the phone will operate normally, except that it may not ring. When the first switch is off, and the second in monitor, you will be able to monitor a line without loading it.

The final part of this conversion involves building an adapter to allow you to connect your phone to something other than an RJ-11 jack. Obtain a Surface Mount RJ-11 Jack, and connect two leads to the Red and Green screws inside it. Connect alligator clips to the free ends of the wires, and you are all set. If you really want to get elegant with it, you can purchase the self-piercing clips just like the ones that come on a real test set.

You may even build several of the adapter boxes. I have a circuit which has test points terminated in 1/4 inch phone jacks, so I have an adapter made up to mate with that.

Hope this will help you in keeping your phones in order…

Bill Ford, WB5SXK
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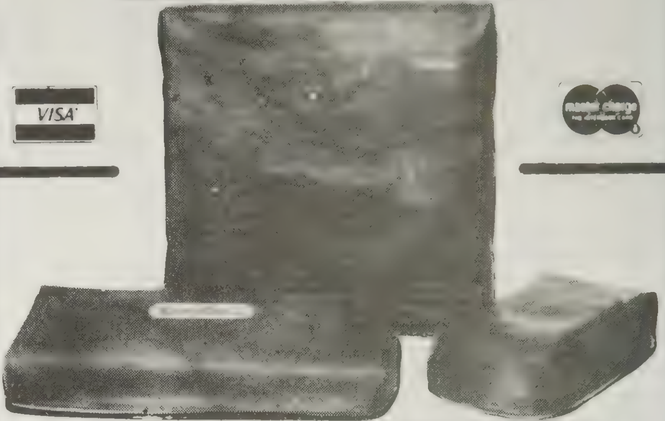

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By Imre Auersbacher

Moonrise/Moonset Program

for the TS-2068

Here is another astronomical program for hams who are "into" EME (Earth-Moon-Earth or moonbounce) communications or satellite observations. It is also useful to amateur astronomers or anyone interested in the Moon. The program accurately computes the moonrise and moonset times for any location on the globe and for any date between 1700 - 2200 A.D. In particular, this program will enable you to plan your EME communication sessions or "windows" of observation, etc. Back in the August 1986 issue of **CTM Magazine,** I presented a program for tracking the Moon as required for EME communication. That program, along with my moonrise/set program and Moon phase program, will give you a fairly complete set of programs for EME.

Moonrise and moonset occur when the upper edge of the Moon's disk appears to be exactly on the horizon. This is a fairly complex computation which requires the calculation of the Moon's right - ascension, declination, & horizontal parallax, the hour angle by spherical astronomy, and a correction for atmospheric refraction. Fortunately, our little Timex/Sinclair 2068 computers can handle these complex calculations quite easily. Besides giving the moonrise and set, the program also outputs the Moon up/down times, i.e., the Moon's upper and lower meridian passage times. For example, at the upper meridian passage, the Moon is exactly due South and at its highest elevation or altitude.

To use this program, you will need to enter your longitude, latitude, and time zone. When entering the longitude or latitude, enter the degrees and minutes separated by a period (or decimal point). The computer will automatically convert the values to decimal degrees for you, as required in the calculations. Also, when entering time zones, use positive (+) numbers for the Western Hemisphere (i.e., EST=Eastern Standard Time= +5, CST=+6, MST=+7, and PST=+8, etc.). This will give the Standard times of moonrise and moonset.

If Daylight Saving Time is in effect in your area, you must then add one hour to the times of moonrise/set, etc. Or you may let the computer do this for you automatically, by subtracting one (1) from your time zone on input (i.e., use +4 for EDT, CDT=+5, MDT=+6, and PDT=+7, etc). The output values will then be correct for Daylight Saving Times.

Below is a sample program run. The chart shows the times of moonrise/set computed for Birmingham, Alabama for the month of August 1987. All charts are computed for an entire month at a time automatically for convenience. Note that there is one day each month (near the last quarter phase) on which there is **no** moonrise, and another day (near first quarter) on which there is no moonset. This will be indicated by 5 dashes, "-----", in the output.

This is completely normal and as it should be. This occurs because the average time interval between two successive moonrises or sets is approximately 24 hours and 50 minutes. Thus, there wil necessarily be some days on which both a moonrise and moonset cannot occur on the same day. The

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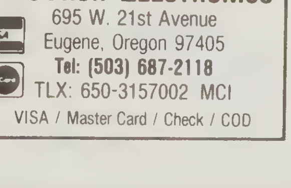

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apparently missing phenomenon of rise or set, however, occurs on the morning of the following day, of course.

By the way, this program also gives accurate results for the extreme latitudes. From extreme latitudes, it is possible that the Moon remains continuously above or below the horizon for more than twenty-four (24) hours at a time, and so there will again be no phenomena. In this case, the computer will display 5 periods or dots, ".....", to correctly indicate the absence of any phenomena.

```
Moonrise/Set - Moon Up/Down Times

Computed for : Birmingham, AL.
Month, Year  : Aug., 1987

Date   Moon    Moon    Moon    Moon
Day    Rise    Set     Up      Down

1  Sa 12:12p 11:22p 05:51p 05:28a
2  Su 01:16p 11:54p 06:39p 06:14a
3  Mo 02:25p -----  07:32p 07:04a
4  Tu 03:36p 12:33a 08:30p 08:00a
5  We 04:46p 01:21a 09:33p 09:01a
6  Th 05:51p 02:19a 10:38p 10:06a
7  Fr 06:48p 03:28a 11:43p 11:11a
8  Sa 07:36p 04:44a -----  12:15p
9  Su 08:15p 06:03a 12:45a 01:15p
10Mo 08:49p 07:19a 01:43a 02:10p
11Tu 09:20p 08:31a 02:35a 03:00p
12We 09:48p 09:39a 03:25a 03:48p
13Th 10:17p 10:45a 04:12a 04:35p
14Fr 10:48p 11:50a 04:59a 05:22p
15Sa 11:21p 12:55p 05:47a 06:11p
16Su -----  01:58p 06:36a 07:01p
17Mo 12:01a 03:00p 07:26a 07:51p
18Tu 12:40a 03:56p 08:17a 08:43p
19We 01:28a 04:48p 09:08a 09:34p
20Th 02:20a 05:34p 09:59a 10:24p
21Fr 03:17a 06:13p 10:48a 11:12p
22Sa 04:16a 06:47p 11:36a -----
23Su 05:16a 07:17p 12:21p 12:01a
24Mo 06:15a 07:44p 01:04p 12:43a
25Tu 07:13a 08:09p 01:45p 01:25a
26We 08:10a 08:34p 02:26p 02:06a
27Th 09:07a 08:58p 03:07p 02:46a
28Fr 10:06a 09:25p 03:50p 03:28a
29Sa 11:09a 09:55p 04:35p 04:12a
30Su 12:14p 10:31p 05:26p 05:00a
31Mo 01:23p 11:14p 06:21p 05:53a
```

```
   1 REM Moonrise/Moonset Times
   2 REM I. Auersbacher Jan.1986
   4 DEF FN a(x)=SGN (x)*(INT AB
S x+100*(ABS x-INT ABS x)/60)
   5 BORDER 5: POKE 23609,10: CL
S: BEEP .05,22: BEEP 0.06,18
   6 PRINT "Moonrise/set, Moon U
p/down times": PRINT : PRINT
  10 INPUT PAPER 7;"Month:";m;TA
B 13; PAPER 7;"Year:";y: LET k=2
*PI: IF y<100 THEN LET y=y+1900
  15 IF ((m<1)+(m>12)) OR ((y<17
00)+(y>2200)) THEN BEEP 0.4,-15
: BEEP 0.6,-20: GO TO 10
  25 PRINT " Date: ";m;"/";y
  30 INPUT PAPER 7;"Longitude ";l
n; TAB 17; PAPER 7;"Latitude ";l
t; PAPER 7;"Time zone:";tz
  32 PRINT
  35 PRINT " Long=";ln;"  Lat=
";lt;"  Zone:";tz: PRINT
  38 LET ln=FN a(ln): LET lt=FN
a(lt): LET u=0: LET h=0
  40 LET lt=lt*PI/180: LET f=INT
 (30.6*(m+1+12*(m<=2)))+INT (365
.25*(y-(m<=2)))+1-621049
  42 IF f>146094 THEN LET f=f-1
  45 IF f<=73047 THEN LET f=f+1+
(f<=36522)
  50 LET n$="0001020304050607080
91011121314151617181920212223242
52627282930313233343536373839404
14243444546474849505152535455565
7585960"
  52 LET d$="SuMoTuWeThFrSa"
  60 LET m$="Jan.Feb.Mar.Apr.May
 Jun.Jul.Aug.SeptOct.Nov.Dec."
  90 GO SUB 1000: GO TO 400
 100 LET t=(f+t/24-72989.5)/3652
5
 110 LET h=4.881628+628.3319E1*t
 112 LET s=4.720009+8399.70927*t
 114 LET s=k*(s/k-INT (s/k))
 116 LET n=4.523602-33.757153*t
 118 LET p=5.8351516+71.018041*t
 120 LET l=s+0.11*SIN (s-p)+0.02
2*SIN (s-2*h+p)+0.011*SIN (2*s-2
*h)+0.004*SIN (2*s-2*p)
 125 LET ra=l-0.043*SIN (2*l)-0.
019*SIN (n)-0.019*SIN (2*l-n): I
F y>=3 THEN LET q=0: RETURN
 130 LET dec=ASN (0.406*SIN (ra)
+0.008*SIN (3*ra)+0.09*SIN (ra-n
)+0.006*SIN (3*ra-n))
 140 LET q=(0.00233-SIN dec*SIN
lt)/(COS dec*COS (lt)): RETURN
 200 LET u=12*ra/PI+ln/15+12*h/P
I: IF u<tz THEN LET u=u+24
 210 LET u=u-w: IF u<tz+0.03 THE
N LET u=u+24
 220 IF u>tz+24+0.03 THEN LET u=
u-24
 230 LET u=0.99727*u: LET t=[illegible]: I
F z=2 THEN LET v=u
 240 RETURN
 300 LET a$="a": IF u>=12 THEN L
ET a$="p"
 310 LET h=INT u: LET n=INT (60*
(u-h)): IF h=0 THEN LET h=12
 320 IF h>=13 THEN LET h=h-12
 330 LET s$=n$(2*h+1 TO 2*h+2)+"
:"+n$(2*n+1 TO 2*n+2)+a$
 340 RETURN
 400 IF (m=4)+(m=6)+(m=9)+(m=11)
 THEN LET days=30: GO TO 500
 410 IF (m=1)+(m=3)+(m=5)+(m=7)+
(m=8)+(m=10)+(m=12) THEN LET day
s=31: GO TO 500
 420 LET days=28: IF (y/4=INT (y
/4))*(y/100<>INT (y/100))+(y/400
=INT (y/400)) THEN LET days=29
 500 DIM c$(4,6)
 505 FOR x=1 TO days
 510 LET w=(f*6.5709835e-2+22.55
066429)/24: LET w=24*(w-INT w)
 515 LET w=w-12.03288: IF w<0
THEN LET w=w+24
 520 LET d=f-(7*INT (f/7))+1
 525 PRINT #4;x;TAB 2;d$(2*d-1 T
O 2*d);
 530 FOR y=1 TO 4: LET t=12+ln/1
5
 540 FOR z=1 TO 2: GO SUB 100
 545 IF ABS q>1 THEN LET s$=". .
. .": GO TO 585
 550 LET h=(-ACS q*(y=1)+ACS q*
(y=2)+0*(y=3)+PI*(y=4))
 555 GO SUB 200: NEXT z
 560 IF ABS (v-u)>2.5 THEN LET s
$="-----": GO TO 580
 570 LET u=u-tz+.205: GO SUB 300
 580 IF s$=c$(y) AND s$<>"-----"
 THEN LET s$="12:01a"
 585 PRINT #4;" ";s$;
 587 LET c$(y)=s$
 590 NEXT y: LET f=f+1: NEXT x
 600 PRINT #4: PRINT #4: LPRINT
 : LPRINT : CLOSE #4: BEEP 0.05,2
2: BEEP 0.05,22: PRINT #0; PAPER
 7;"[illegible]"
 610 LET q$=INKEY$: IF q$="" THE
N GO TO 610
 620 IF q$="Y" OR q$="y" THEN BE
EP 0.05,20: RUN 5
 650 CLS : PRINT FLASH 1;AT 10,6
;" Program Terminated ";
 660 CLOSE #4: GO TO 9999
1000 INPUT PAPER 7;"City name: ";
 LINE b$: PRINT "[illegible]: ";b$:
1010 PRINT : PRINT PAPER 6;AT 13
,4;"Output to which device? "
1015 PRINT PAPER 6;AT 15,9;"1-TV
 Screen ";AT 16,9;"2-TS Printer"
1020 BEEP 0.05,15: PRINT PAPER 6
;AT 18,4;"Please pick option (1-
2)": PAUSE 35
1030 LET q$=INKEY$: IF q$="" THE
N GO TO 1030
1035 LET t=CODE q$-48: IF (t<1)+
(t>2) THEN BEEP 0.5,-15: BEEP 0.
6,-20: GO TO 1030
1040 BEEP 0.05,22: PRINT PAPER 1
; INK 7;AT 14+t,6;">>"
1050 PAUSE 50: IF t=1 THEN OPEN
#4,"s": CLS : GO TO 1060
1055 OPEN #4,"p": PRINT AT 20,4;
" See printer for output "
1060 PRINT #4;"[illegible]
[illegible]": PRINT #4
1065 PRINT #4;"[illegible]: ";b
$: PRINT #4;"[illegible]: ";m$(
4*m-3 TO 4*m);", ";y: PRINT #4
1070 PRINT #4;"[illegible] Moon [illegible]
[illegible] [illegible]": PRINT #4;"[illegible]
 [illegible] [illegible] [illegible] [illegible]"
1075 PRINT #4;"[illegible]
[illegible]"

1080 RETURN
9900 SAVE "moon" LINE 1
```

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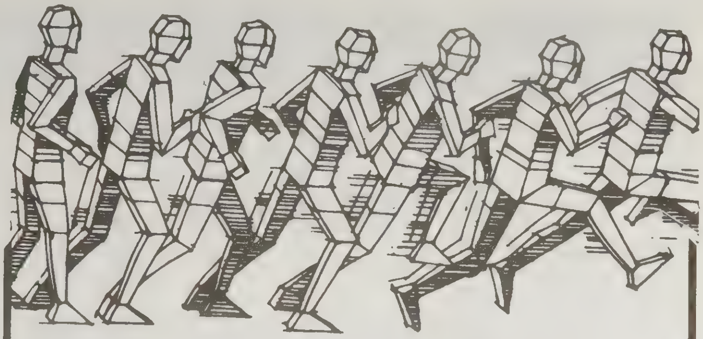

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By Michael Bryce, WB8VGE

Solar Power

Mounting of solar panels don't have to be mounted on roof tops. The mounting of the panels on the ground have many advantages.

For the last several months, we have been looking into solar power. This month we'll take a closer look at putting all this together into a working system.

There are two different avenues of thinking when it comes to powering your station from the sun. First, do you want (or need) a stand-alone system? Or, how about just enough power to back up an emergency powered communication system. In my shack, I went for the total stand-alone. Both system have some benefits and faults.

The stand-alone system is by far the most satisfying. In spite of all that's been said, there are far more photovoltaic stand-alone systems than any other. There is a lot of user satisfaction in producing your own electricity from sunlight than in buying it from a utility. A photovoltaic stand-alone system represents a return to the energy freedom of earlier generations-with the same freedom to do without when the sun doesn't shine. In other words, when the batteries go poop, I go off the air.

With a stand-alone system, the start up expenses will be higher.

Batteries must be used to store the un-used energy. Battery storage will be covered in length further into this series.

To get things started, with battery storage, for each watt of PV power, you must provide about 3 ampere-hours of battery storage. If you have a single 35 watt panel, about 105 ampere-hours of storage is recommended. Luck be with us, as this is a standard size battery. With that single 35 watt panel, and battery, we should be able to operate quite a bit of equipment, provided we have the sunshine to recharge the battery between usage. Having been bitten with the solar bug, we soon find that we want more power! In general the amount of money available determines the size of the photovoltaic system. If money is no problem, then simply decide on the number of kilowatts you need and get out the check book. If you're like the rest of us, with little extra money to play with, we have to set priorities and satisfying them from the top until we run out of cash

Make up a worksheet as an energy menu, selecting what you want to operate and for how long. Compute the current and voltage to watts and then multiply watts times hours to obtain watt-hours. Add these all together and that figure will give you a good idea the size of the photovoltaic array you will need. To get a handle on just how much power photovoltaic modules can make, multiply peak output of the array (in watts) by 5 to determine daily watt-hour total.

The "5" represents average daily peak sunshine hours for the whole United States. Remember that peak hours represent only

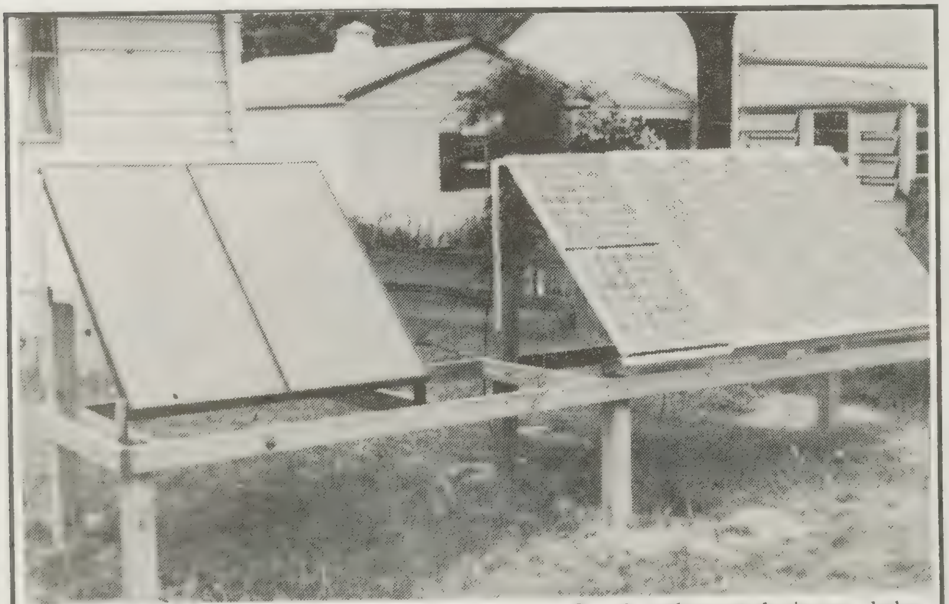


Photo A. This is the new mounting system for the photovoltaic modules. The panels on the left are Solvonics thin film units. The right side, Arco 16-2000. The space between the modules will be filled up when money fills back into my pocket.

about half the total hours of sunshine.

For an example. A 35 watt array in the central part of the country produces about 175 watt-hours a day, varying from about 105 watts-hours in the cloudier Northeast to 245 watt-hours in the sunny Southwest. Assuming you are in a average part of the country, you'll get 175 watt-hours a day from each 35 watt module

Now you know how many watt-hours a day you want and how much a 35 watt module can provide. The final step is to divide your electricity requirements by the output of a 35 watt module. Let's say you need 500 watt-hours a day. Divide 500 by 175 = 2.86. You'll need about 3 modules do supply your needs. Also, keep in mind the need to increase the amount of battery storage to fit the extra panels.

Photo B. Treated 4 X 4's are bolted together with lag bolts.

Connecting up more than one module is a fast and easy way of increasing the current into the batteries. There are a few points that should be made. First, install diodes in the positive lead of each module. The protective diodes are silicon PN junction 1N4004s. The purpose of these diodes is twofold. Should a module become shorted, the diode will prevent current flow from the batteries or the other modules within the array from flowing into the defective module.Second, the diodes will prevent potential problems from shadow-ing. With out the diodes, current will flow into a module that is in the shade causing overheating, this overheating will soon destroy the cells within a module. The unsha-dowed modules will effectively back bias the diode of the shadowed modules, thus preventing current flow and therefore prevent damage to the module. While the use of common 1N4004 diodes were used in my case, an alternative choice of diodes would be Schottky-barrier type devices. They have a forward bias voltage drop less than that of a normal PN junction diode. They are not cheap. About $2.00 each verse 20 cents for the other type.

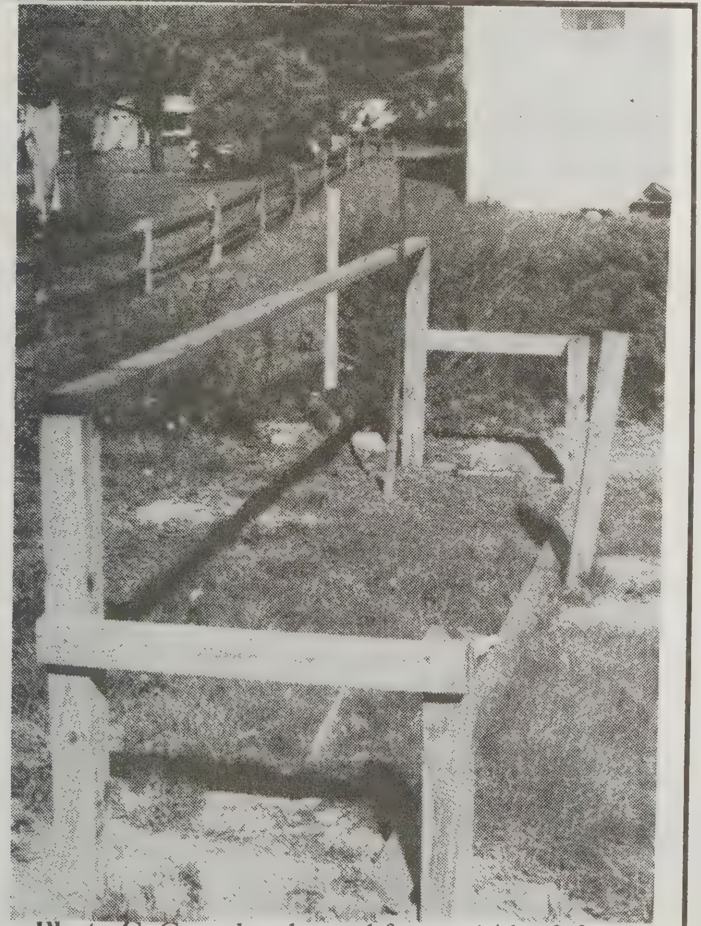


Photo C. Completed wood frame. 14 by 3 feet

There are several other methods to figure out the size of the array, this one seems to work the best. One final thought, you never have enough PV power!

As some of the newer panels arrive on the market, you may be able to reduce the size of the array, but like I mentioned above you never seem to have enough power. Some of the newer Arco modules have peak power of over 45 watts.

Photovoltaic panels are made in different sizes and power ratings. The 35 watt unit does seem to be the, standard. The 35 watt panel should produce about 2.1 amps at 18 volts. Since I have started to play with power from the sun, I have purchased a great deal of panels. I have found on thing in common. They are all different when it comes to mounting the panels. The Arco ASI-1600 modules are a real kicker to mount.

The photographs show the new mounting system that I construct-

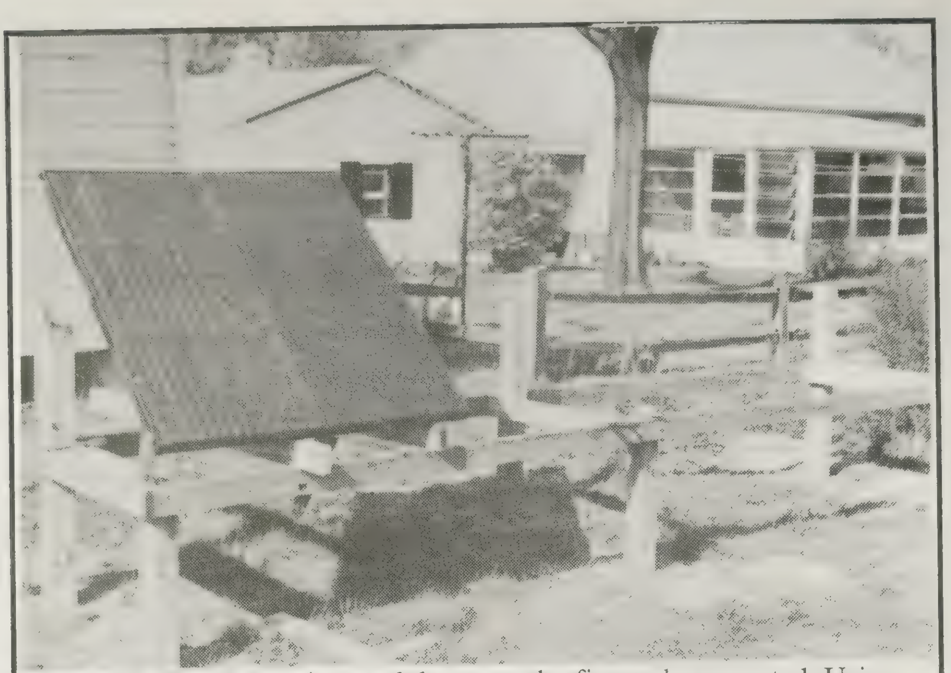


Photo D. The Solvonics modules were the first to be mounted. Using angle stock, the tilt of the modules can be adjusted.

ed. I use treated wood and aluminum angle to hold the panel. The frame is 14 feet long and just a bit over 3 feet wide. The 4 X 4 posts are held together with large lag bolts. Concrete was poured into each leg post at a depth of 4 feet.

Aluminum angle, 1 1/2 X 1 1/2 X 3/16 is use to hold the Arco panels. The Solvonics panels were a breeze to mount. (Look for a review of the Solvonic panels)

The protection diodes are mounted between solder terminals in a metal box mounted underneath the array frame. Plastic electrical conduit was used to connect up the modules.

All the module "+" leads are connected to their diodes within the diode box and the cathodes of all diodes are connected together on a bus bar, thus effectively paralleling all "+" terminals of the modules. The modules "-" leads are also terminated inside the diode box. Again using a copper bus bar, completing the parallel module configuration. Number 12 stranded copper wire was used throughout.

From the array frame, number 4 gauge stranded copper wire leads into the battery room inside the house.

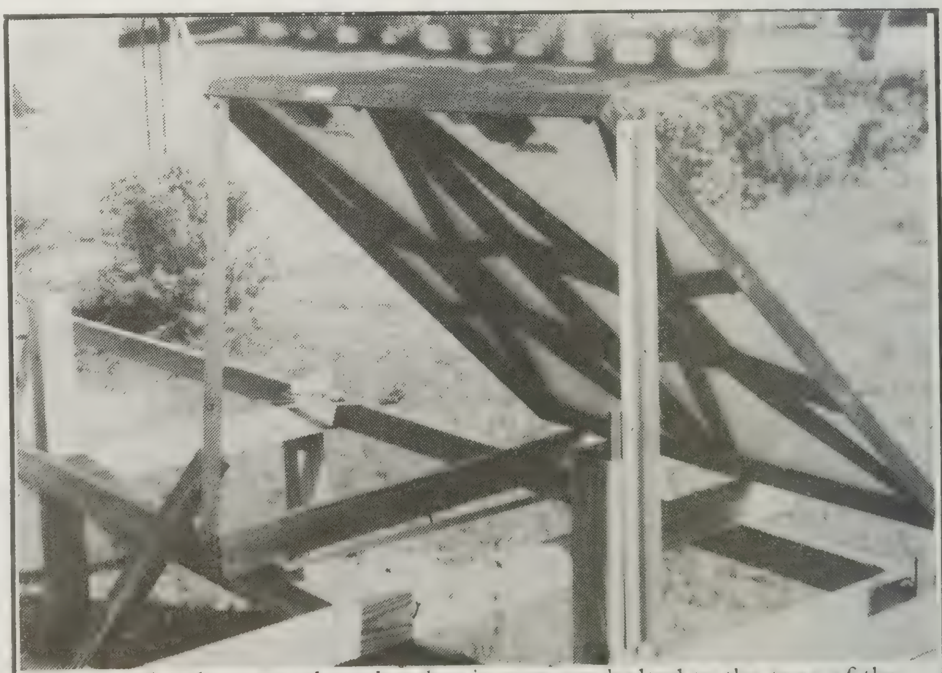
The metal frame is grounded against lighting.

Mounting structures of the arrays generally go on the roof (except in my case) if the pitch of the roof is close to the tilt required for efficient collection of solar radiation. Don't get to worried about not haveing the exact, proper tilt, you'll won't loose much power if the angle is orientated wrong. Roof mounting is nice to keep rock s, your neighbor's kids and the various other critters from the array.

Ground mounting allows exact southerly orientation and the opportunity to adjust the array tilt for maximum performance. Again, don't worry about that tilt. Ok, Ok, for those who are worrying about the proper tilt, the array should be mounted at the angle corresponding to the latitude of your location. You can go up to 20 degrees off-angle and won't cause much loss in power.

Some of the newer modules can actually replace the roof sheathing, doing away with the shingles. If your building a new house, integral mounting is a good choice because the array is mounted directly on the rafters, taking the place of the roof and again eliminating the need for shingles, tar paper and sheathing. This method is very costly. Most people will go with a rack mounted array. A mounting bracket is fastened to the house and the panels are then mounted to the rack. While this method is general-ly used for ground mounting, like the one shown in the photos, rack mounting can be used on a roof. Keep in mind, when roof mounting a photovoltaic array, wind loading, snow loading and accessibility for periodic cleaning.

With no moving parts to wear out, the photovoltaic array should last a life time. Maintenance requires little beyond an occasional



mounted to large steel angles that in turn are bolted to the tops of the 4 X 4 posts.

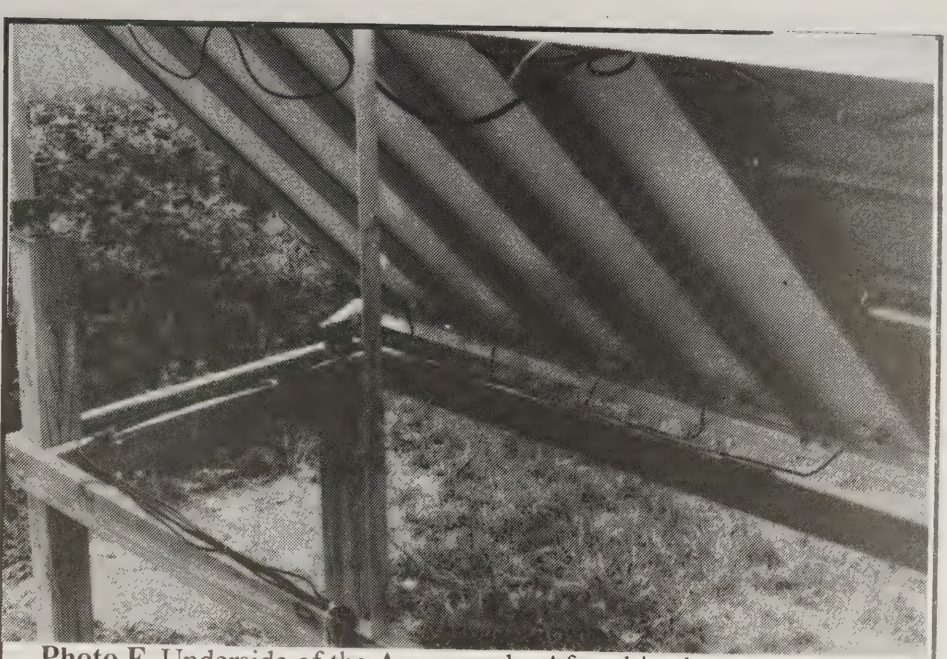


Photo F. Underside of the Arco panels. After this photograph was taken, the wiring was inclosed in conduit. The diode/connecting box is not shown.

washing to remove dust and pollutants. If the array is ground mounted, an seasonal adjustment of the tilt may increase maintenance a bit.

Among the hazards for photovoltaic systems are hail, rocks and other flying objects, and lighting.

Because of their design, the Solvonics modules are less prone to damage to the above hazards.

So far, I have been referring to the system which I own. Since I use all the power that I'm able to generate, I chose to keep the system operating at 12 VDC. My reason? All my radio gear will operate just fine from 12 volts. Lighting for the shack and the rest of the house is supplied via low voltage florescent lighting. The influx of equipment from the RV people allow me to use just about anything I could ever need. The only problem with low voltage operation is the voltage drop under heavy loads. I'm still fighting this but have learned quite a bit in the process. I'll discuss this problem more in the battery storage part of the series.

It should be noted that you can go up to a higher voltage, say 24 or even 36 volts. Now why would one ever need to go that high? Inverters, that's why. Probably no topic will generate so much controversy as the inverter.

An inverter does exactly as the name implies, converts the stored PV energy from the battery pack to 117 volts AC. This allows the PV systems to operate regular household appliances and equipment. The problems with inverters are: 1) they are very expensive, and 2) they are inefficient in that they draw typically 3 or 4 amps just sitting there running nothing. Let me be fair here, some of the very newest high tech inverters are very efficient, drawing only milliamps at rest. They are VERY expensive. The new FET inverters can cost over $1000 and some over $2500. Most inverters are either square wave, sinewave (the best) or pseudo sinewave (second best). Inductive loads don't like square waves. So if you want to run something other than a universal motor (electric drill), or lighting, you'll need a sinewave or pseudo sinewave inverter.

Most inverters run about 80% efficient at full load. The newer models boost efficiencies close to 96%. This brings us back to the higher voltage arrays and battery banks. That's right, increase the array voltage and you have to increase the battery bank voltage. also. At a normal 12 volts system, using a inverter is less than practical. Even using the new Heart FET model, the highest output we can achieve would be 1.2 kw. Heart does sell a 2kw 12 volt unit, but can you imagine drawing 150 amps from your battery system with a quarter ohm resistance in a connector? Instant melt-down! Low voltage inversion requires strict attention to connectors and cable diameter. Less money will have to be spent on cable to the inverter input from the batteries. To rid ourselves of these problems, we increase the battery voltage. Double the supply voltage and cut the current in half. Increase the supply voltage even more and the current will drop again. Now you can see why the higher voltage systems have their merits, if you want to invert the stored Dc into 117 AC.

We have several more components that have to be used to allow us to operate our stand-alone system. Aside from the batteries, we'll need this thing called, " A Charge Regulator."

Looks like that will have to wait until next month as I'm out of space.

I can remember when nuclear power was introduced. Power so cheap we won't even have to meter it. That dream is dying rapidly, but there's a successful nuclear reactor some safe 93 million miles away that working just fine, beaming it's power right to my back yard.

Michael Bryce, WB8VGE
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By Robert Adam

QLues

Beginning this issue we have a series of software reviews for the QL

As if the QL were not a bargain in and of itself at about $200.00, think about the set of programs which come with the computer and it is almost unfair to those other "real" computers. Starting this month we will take an in depth look at these four programs which are worth many time the price of the computer in their own right.

If you have ever gone out and priced word processing software for the IBM and compatibles, you will find that the starting price of anything more than simple text editor starts at about $150.00, and if you want a full featured program (such as WordStar®) you may have to pay up to as much as $500.00! Yet the QL comes with a program known as Quill (although it must be called QL Word processor in the U.S.of A.) which rivals even WordStar. In fact as you become familiar with Quill you may find that it contains even more features than the quintessential IBM word processing classic. Such an example would be imbedded printer commands. On WordStar they show on screen - such as ^D - creating something less than "what you see is what you get". With Quill, those printer codes - such as bold, underline, superscript and/or subscript - do not appear on screen. Instead your text is either highlighted, underlined, printed high or low (or combinations thereof) as requested.

Let's take a minute to look at some of the features which are to be desired in a word processing program, and then at how Quill deals with them. To start at the beginning one should look at the installation process. With Quill, as with all of the packaged software, this is as simple as inserting the microdrive cartridge in mdv1_ and then pressing a screen selection (F1 or F2). The program will autoboot and you are ready to run.

To Printer

If you are using a QL printer, or most Epson compatibles, there is no need to customize for your printer,but the procedure is simple in case you have to use another type of printer, or make some other changes. In fact, even if you are not using the QL printer, your customized printer driver may already have been filled out by the folks at Psion as a look at the INSTALL menu will reveal.

Although the QL printer codes have been installed as the default, a number of others have already been included and wait your selection.

What does one find on the installation process? First you will be asked whether you will be using one of the serial ports, or some other type of interface. If you are using a parallel interface (such as the Miracle I/F) that plus into a SER port, you can select the default option. In either case you will be asked to specify the port through which text should be sent to a printer. (What's that you say? You have no printer? Then what are you doing with a word processing progam in the first place? Send ing your files via modem you say? Okay, we will deal with that soon.)

Once that choice has been made you now have an opportunity to tell the QL what printer codes your printer needs to perform certain tasks. These codes will be found in the manual which came with your particular printer. You will have to enter the codes for the four on screen modes - **bold**, underline, $^{\text{high print}}$ and $_{\text{low print}}$. If your computer does not have these functions, or you wish to use these functions for some other print feature (such as *italics*) you just substitute those codes...Quill does not mind. For example,if you enter the code for italics instead of low print (subscript), you will select the low print feature on Quill when you want italics. Although the on screen display will show subscript, when printed your printer will print in italics.

Once these printer codes have been entered (or checked if you are using a Psion supplied driver) you will find a number of other printer function for which the codes may be entered. These include intitialization sequences, whether or not you need a Line Feed, Carriage Return or both at the end of the line and other background needs of your particular printer.

The last ten areas on this menu allow you to do just about anything that your printer is capable of doing, even if certain features are not "officially" supported by Quill. Although Quillallows for four printer functions to be selected

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from the CHANGE FONT function while editing, you may want to add additional features without eliminating those already included. Perhaps your printer is capable of producing special characters, such as foreign characters, which you need. While it is true that your QL can produce foreign characters on screen, they probably will not correspond to those used by your printer. This is where these ten "translation" entries come in. By first indicating the QL character and following it by the proper printer ASCII code (or in the case of special features, a set of ASCII codes), you can utilize the desired function by simply typing your user defined control code(s).

Once you have modified the driver to your satisfaction, you can exit the modification area, make sure that it is now the selected driver and SAVE the modified driver back to your cartridge. Unless you change printers or want to alter features which you have selected, you never have to go through this procedure again.

When you are ready to actually use QUILL, unless you have modified the BOOT program, it will automatically boot upon power-up, and you will be in edit mode. You may want to initially visit the DISPLAY option so that you may customize your screen, and output to your needs. A hint at this point may be in order. If you find that you have indeed changed from what the initail defaults set by PSION are, you may want to create a QUILL file with no text, and LOAD this each time you use QUILL. In this manner you save yourself the trouble of setting these options each time you restart the program. (This is one of the few areas where programs such as WordStar have an advantage. You may change the program defaults and save yourself this step.) You may want to call the file something as simple as START which indicates that this is the settings you wish to start with.

The actual text entry and editing procedures are simple enough, and we won't go into them at this time.(If you have any particular questions or problems feel free to address them to me in care of CTM and I will try to answer them.

If I feel that the question warrants, I will include the answer in this space. Otherwise please include a SASE.)

By Modem

I haven't forgotten those of you who mentioned that you wanted to send your files by modem rather than printing them out to a hard copy. The procedure is very simple so here we go!

When your file is all edited and you are ready to send it, you start out in the same manner as if you were going to send it to a printer. When the prompt shows the word "print " you overtype the word mdv2_name (assuming that you have a formatted cartridge in the right hand microdrive ready to receive the file).

This will produce a file called "name_lis" on your cartridge. (Of course you may substitute any descriptive name or the one we used here.) Now you may leave QUILL and fire up your communications program and transmit this file in the normal manner. (Has anyone using QLTerm 2 multitasked with QUILL and then just written the file directly through the modem? I just this second thought of that and will have to try. I will let you know what results I have in a future article.)

Having used QUILL, WORDSTAR and other "major" word processing programs, I can say without fear of contridiction that QUILL can hold its own with the best - and even top many of them. Considering that it is included with your purchase of a QL, it becomes truly amazing.

Next time in QLues we will look at the QL database - ARCHIVE. Your comments are solicited now and always. Let me hear from you.

Robert Adam
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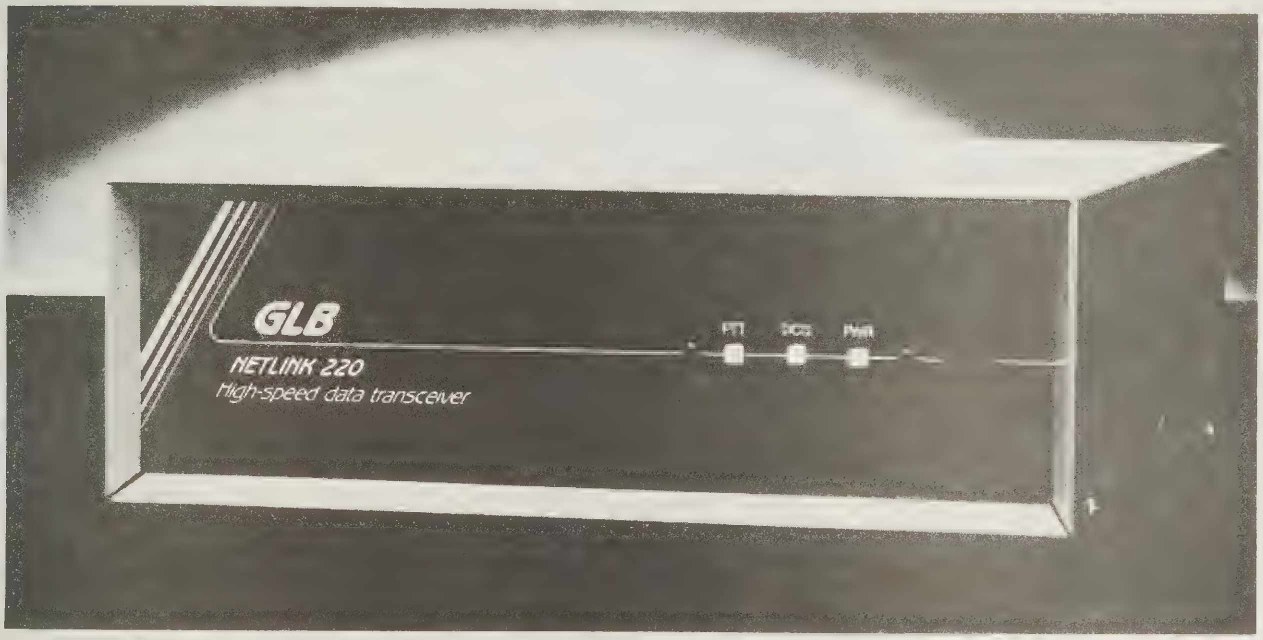

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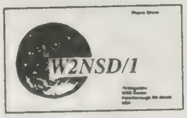
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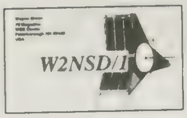
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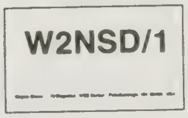
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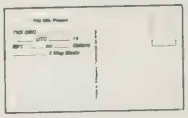
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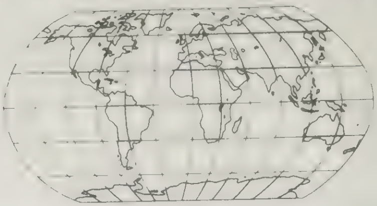
QSLs

Now you can get the highest quality QSL cards without spending a fortune! We put these cards on our press as filler between jobs; it gives the pressmen something to do and lets us print QSLs for you at an absurdly low price.

Not that we skimp: All three styles are produced on heavy, glossy stock, in two colors (blue globe or satellite with black type). At these prices, you can start the new year out right by QSLing all those disappointed hams who've been waiting for your card. Tell 'em the card was printed by Wayne!

The World Is Your's For Only $5.00



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Save yourself the humiliation of never having heard of McDonald Island (what's the prefix?), Jan Mayen (prefix?) or Kure Island (prefix?).

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Code Tapes

We've had so many phone calls from people wanting our famous 73 code tapes that we've decided to bring them back!

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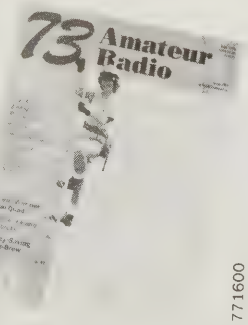

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73, WGE Center, 70 Rte.202 No., Peterborough NH 03458-9995 [illegible] This offer expires December 31, 1986.

771600

By Keats A. Pullen, E.D., W3QOM

Low-Pass & High Pass Circuits

It is often necessary for us to restrict the range of frequencies that we can "hear", as there is so much possible sound around us and so many different radio signals around us that total confusion would result if we did not do so. This means that we must have a means for limiting the signals to those we wish to hear or watch. This is what all of the tuned circuits in television receivers are supposed to do (albeit rather poorly sometimes, as my ham readers may be well aware).

This means that we must have the ability to select the range of frequencies that we are using. Our ears do this for sound, as we typically can hear frequencies from about 32 Hz to between 5000 and 15,000 Hz, depending on our age and other factors. In short, "Mother Nature" has provided us with built-in limiters on both what we can hear and what we can see.

What kind of devices are needed to enable us to separate out ranges of frequencies for whatever purpose we have in mind? Resistances in principle have no capability to give preference to any specific range of frequencies over another; we have to turn to inductors (coils) and capacitors to help us out on this. In fact, we will find that all components have what are called parasitic properties in that an ordinary resistor will have some properties of both the capacitor and the coil, and the same is true for inductances and capacitances.

Before we start out examining the precise properties of these elements whose characteristics are a function of frequency, it is desirable to look into a rather curious but very important property of all these devices. Two gentlemen by the names of Bott and Duffin originally pointed this out, even though one would think that it should be second-nature.

One might call this principle **"SEPARABILITY"**;itisextremely important to us. If I have a resistance, it will have a certain amount of internal inductance in spite of whatever I may try to do to prevent it. That inductance will be a series property, so that the resistor will appear to be a combination of a resistance and an inductance in series. But there is also some capacitance in the resistor, and it appears to be in parallel with the resistance and/or inductance. In fact, both the capacitance and the inductance are strictly distributed, in that if one examines the device very carefully, one finds that the capacitance is between different parts of the resistance AND what called "self-capacitance," and the inductance is similarly distributed throughout the resistor itself.

What it comes down to is that whereas inductance and resistance for practical purposes behave as if they are series elements, the capacitance will appear to be in parallel with the R-L series combination. To extend the idea a little farther, my device may appear to be primarily a resistance-capacitance parallel combination; if so, then the next separable element of the circuit will be a series inductance. I can only "in pretense" combine that series inductance into the parallel combination of resistance and capacitance.

I don't plan to consider Thevenin's and Norton's ac theorems at this time; suffice it to say that if I try to apply these theorems to such a combination, I find that ALL of the resulting elements will have values that are a function of frequency even though the resistance, inductance, and capacitance values at the start may not be functions of frequency.

What the Bott-Duffin principle states is that as one builds a network out from some components, the new component must either be combinable into the existing components and "disappear", or it muct be separable as either a series or parallel element if the inside "shell" the capacitance for the resistor must be treated as a parallel combination to the series resistance and inductance, and why the spreading resistances for transistors, which we will meet in a later segment of this series, must be in series with the parallel admittances that are inherent to the basic components of the transistor, input admittance, output admit-tance, and the two transfer admittances. Except for special cases where the properties of the Bott-Duffin principle must be used, the next elements outside of the spreading resistances with the transistor must be shunt, usually voltage sources, across the device terminals. We will examine this in more detail when we consider the question of the validity of the beta of the bipolar transistor.

Properties of Inductances

An inductance hinders the flow of current, and is particularly effective in limiting current as the frequency of an applied signal is increased. In fact, if one closes the circuit from a battery through an inductance, and observes the flow of current with a shunt and a scope (CRO), one quickly notes that the current does not turn on instantly, but builds up slowly, whereas with a resistance, it increases to full value very quickly. Inductances used to be called "chokes" for that exact reason; they tended to choke out variations of current in a circuit.

We call this property inductive reactance. In the process of slowing down the increase of current, it stores energy in the magnetic filed that is generated by the current. (You can verify the existence of this magnetic field by placing a compass near a wire through which you plan to pass dc. When the current flows, the needle will deflect if the orientation of the wire is north-south.)

If you interrupt the current sharply with a switch, you will find that a neon bulb connected across the terminals of the switch will light even if you pass current from a 1.5 volt battery like a D cell through a winding of a transformer. The magnetic field that is associated with the current decays fast enough to light the neon bulb, which requires about 90 volts to operate, as it is dissipating the energy stored in the magnetism that results from the current flow. The faster the current is cut off, the higher the voltage will be. This is the principle of the spark system in your automobile.

The current that will flow in an inductance as a function of the frequency of the applied voltage is defined in terms of the equation:

$$I = V/(2\pi fL)$$

where the value of π is 3.14159, and f is the applied frequency. The voltage, V, is an alternating voltage of frequency f, and the inductance value is L. (Here we are ignoring the internal resistance, and also the fact that the current will be out-of-phase with the voltage.)

The current will increase after the voltage has increased, and decrease after the voltage has decreased because of the energy stored in the magnetism associated with the current flow. This of course occurs in any circuit in which a current is flowing, but the effect is only noticeable when appreciable inductance exists in a circuit. In the absence of resistance in the circuit, the "lag" is a quarter wavelength, which is 90 electrical degrees out of 360. The result of this lag is that while energy is stored in the magnetic field in one 90 degree period, during the next it is returned to the circuit, so that in theory at least, no energy is lost to heat with the inductor. (Actually, the internal resistance will be sufficinet that at least some energy is lost. This is very important in resonant circuits, which we will consider in a folowing segment of this series.)

Properties of Capacitances

The capacitor behaves quite differently. It stores charge in an electric field rather than in a magnetic field. As a result, the behavior of the capacitor is quite different. The amount of charge that is stored is a function of the maximum voltage, and the more times the voltage reaches that maximum, the more total charge will have been stored. As a result, the current that flows in a capacitor under an alternating voltage is defined by the equation:

$$I = 2\pi FCV$$

Clearly, in ths case, the current increases with frequency rather than decrease as with the inductance.

Ell Networks

Based on these two components and resistances, we can build circuits that will pass more current as the frequency increases, or pass less current, as we desire. At the same time, I can set up a circuit that will allow development of more or less voltage as a function of frequency in a similar manner. The simplest arrangement for doing these things is called an "ELL" network. With the series element on the side of the voltage source, and the shunt on the output, then I can construct the following table as a function of increasing frequency:

Series element	Shunt	Current	Voltage
L	R	decrease	decrease
R	L	increase	levels
C	R	increase	levels
R	C	decrease	decrease

Clearly, the L-R and the R-C configurations are going to limit the frequency response as the frequency rises; on the other hand, the R-L and the C-R configuration is less likely to introduce "garbage" into a circuit than are the more commonly used L-C circuits. (This is particularly important in the design of high-fidelity audio or stereo systems.)

Corner Frequencies

The expression 2π has the value 6.28318, and appears wherever we have energy storage and return in a circuit. Physicists would say that it was an essential in the storage of both potential and kinetic energy, or the energy of position and of motion. This principle is of tremendous importance to us who are interested in either computers or in amateur radio. The frequency at which the reactance of either a capacitor or an inductor equals a loss resistance in magnitude is the dividing line between change of property of the circuit. It defines the corner frequency, and the frequency at which a circuit behavior changes from no variation in output as a function of frequency to one at which the hange is substantial, namely at least a doubling or a halving of tput voltage as a function of equency.

At the corner frequency, the sponse has change by three cibles (dB), and at a frequency displaced from that frequency, it will change by at least six dB per octave (two-by-one frequency ratio). The equations for these frequencies for inductors and capacitors are:

$$2\pi fCR = 1 \text{ or } wCR = 1;$$

$$2\pi fL = R \text{ or } wL = R.$$

where the value of w is $2\pi f$.

Sometimes I use these networks that exhibit the corner-frequency property to prevent passage of low frequencies, as in the coupling between two amplifier stages that are intended to pass speech, and sometimes I use them to prevent passage of higher frequencies, as in the case of a power supply filter, where I may wish to prevent passage of 60 or 120 Hz while allowing dc through. Typically, these kinds of functions are usually performed by R-C or C-R circuits, as capacitors are much better behaved in this kind of application than are inductors. The main advantage of inductors is the small voltage loss across them, a property very useful in power supplies. (In this application large amounts of current must be smoothed. They are usually used with capacitors, as will be discussed later.)

One of the important characteristics of R-C circuits that is often neglected is the fact that the transients (erratic behavior when a voltage or current spike is applied) is substantially reduced compared to L-C circuits. They may have to be placed at points in a circuit where power is not required to take advantage of this. An example is placing such a network at the input to an audio driver amplifier instead of the usual output L-C network for dual-speaker systems. Of course, each speaker then requires its own driver amplifier along with the required stabilization networks. The improvement in clarity of complex sound waves like generated by a large orchestra or chorus is significant.

More details of the characteristics of these circuits will become evident as we proceed to turn L-C circuits. We will have to see the consequences of losses in each component as well as their parasitic, or unwanted properties, that can become very important under those conditions.

Keats A. Pullen, Jr., W3QOM
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BIGGER! BETTER! BE THERE!

By Theo Turk, WB8ADA

Morse Keyboard

Putting the little T/S 1000/1500 Computer to a good use in the shack

This program incorporates several features not found in other programs of this type.

First of all, there are 10 Message Buffers, each one is variable in length and holds approximately 40 characters.

Second,the operating speed can be changed as desired.

Third, a "Practice mode" is included for those trying to learn morse or to increase their code proficiency

Refering to Figure 1, the output is fed to Port 1 of the Z80/PIO (Parallel input/output) IC. It is a very versatile chip - (2) 8 bit bidirectional ports, handshaking etc…

The chip can be purchased for around $1.50 thru mail order and although 1 bit of one port is used, as you can see, there are various IC's that would be considered more suitable for interfacing.

The actual program is 1200 bytes long but with a little time and patience, it can be entered efficiently. Line 2 contains all of the subroutines that are used such as clk, key, enter, dot, dash, ddot, ddash, dtdh, dhdt, final and pause. Line 3 is the actual start of the program. Line 4 contains the mesout buffer routine. Line 5 contains the speed routine. Line 6 contains the "Practice" routine. Line 7 is the huge - Look Up Table - that is used to find the character patterns.

Keyboard Mode…

When first run, the computer initializes the PIO with Control Mode 3. It then enters the Keyboard mode and from here, it branches via the various commands.

1. To change the operating speed, press "Shift S". Speed (01 to 99) is then entered using a 2 key stroke input. Return is made to the Keyboard mode. Note: Speed is relative and does not reflect the true WPM.

2. To enter the Practice mode, press "Shift A". A random selection of numbers (0 to 9), letters (A to Z) plus various other keys such as ("), (:), (?), ((), ()), (-), (/), (;), (,) and (.) is made and is sent to the output. The operator is then requested to press the corresponding key.

If the correct key is pressed, a jump is made to the random generator and a new number, letter or other character is selected and outputted in the same manor, waiting for operator response. There are also 7 special characters that may be picked at random. They are:

1. Wait (AS),
2. End of Message (AR),
3. End of Transmission (SK),
4. Dollar (SX),
5. Apostrophe (WG),
6. Paragraph (AL),
7. Error (8 dots).

If any one of these is chosen no operator response is required. After a 3 second delay, a jump is made to the random generator. Note: To repeat the previous sent character, press "Shift R". Note: To return to Keyboard mode, press "Enter".

3. To select and output any one Message Buffer, press "Shift (0 to 9)".

Refer to the Buffer Table/Listings to see how the messages are entered. Note: The last character, after the message content, must be "TAN" - shift, enter, "E" key. This signals the computer as to the end of message. A return is made to the Keyboard mode automatically or by pressing "Enter".

4. To stop, press "Shift Enter".

Continued on next page

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1  REM (followed by 1200 X's)
2  LET A$="C3FF403A7B400E023DC80D28FB18FBCDBB023EFDBCD8444D
     CDBD077EA7C9CD914038FBFE1C38F7FE2630F3F5CD914030FBF1D6
       1CC93E01D301CD85403EFED301CD8540C93E01D3010603CDF840
     3EFED301CD8540C9CDB740CDB740C9CDC640CDC640C9CDB740CDC640
       C9CDC640CDB740C9AFD3010603CD854010FBA7C9"
3  LET A$=A$+"CD730ECD230F3E19327B403ECFD3033EFED3033E07D303
     CD914038FBFE79C8FEE1CAA641FEE3CAC041FE77210A00284DFE75
       2114002846FEDA211E00283FFEDE2128002838FEDF2132002831
     FE72213C00282AFE7121460028 23FE70215000281CFE73215A0028
       15FE742164002 80E57CD2842D5CD9140D1BA28F8189A"
4  LET A$=A$+"CDD809010400092 3E5CD9140E1D216417EA7200706 07CD
     F84018ECFE76CA1641FEC9CA1641CD284218DD"
5  LET A$=A$+"CDA040CB27CB27CB27CB27F5CDA04047F1A828EC327B40
     C31641"
6  LET A$=A$+"ED4B324003CD2015EF3037160430804100000802E02A10334
     CD8A15ED433240D64730FCC6476F327C40CD284238D2CB75281121
       004611FFFF0625193 0C310FE000018F5E5CD914038FBF5CD9140
     30FBF1FEDB20083A7C40CD284218E8E1FE76CA1641BD20DFC3C041"
7  LET A$=A$+"FE262006CDE540C3F340FE272009CDEC40CDD740C3F340
     FE282009CDEC40CDEC40C3F340FE292009CDEC40CDB740C3F340FE
       2A2006CDB740C3F340FE2B2009CDD740CDEC40C3F340FE2C2009
     CDDE40CDB740C3F340FE2D2009CDD740CDD740C3F340FE2E2006CD
       D740C3F340FE2F2009CDE540CDDE40C3F340FE302009CDEC40CD
     C640C3F340FE312009CDE540CDD740C3F340FE322006CDDE40C3F3
       40FE332006CDEC40C3F340FE342009CDDE40CDC640C3F340FE35
     2009CDE540CDEC40C3F340FE362009CDDE40CDE540C3F340FE372009CDE5
       40CDB740C3F340FE382009CDD740CDB740C3F340FE392006CDC6
     40C3F340FE3A2009CDD740CDC640C3F340FE3B2009CDD740CDE540
       C3F340FE3C2009CDE540CDC640C3F340FE3D2009CDEC40CDE540
     C3F340FE3E2009CDEC40CDDE40C3F340FE3F2009CDDE40CDD740C3
       F340FE1C200CCDDE40CDDE40CDC640C3F340FE1D200CCDE540CD
     DE40CDC640C3F340FE1E200CCDD740CDDE40CDC640C3F340FE1F20
       0CCDD740CDE540CDC640C3F340FE20200CCDD740CDD740CDC640C3
     F340FE21200CCDD740CDD740CDB740C3F340FE22200CCDEC40CDD7
       40CDB740C3F340FE23200CCDDE40CDD740CDB740C3F340FE2420
     0CCDDE40CDEC40CDB740C3F340FE25200CCDDE40CDDE40CDB740C3
       F340FE0B200CCDE540CDD740CDEC40C3F340FE0E200CCDDE40CD
     EC40CDD740C3F340FE0F200CCDD740CDDE40CDD740C3F340FE1020
       0CCDEC40CDDE40CDB740C3F340FE11200CCDEC40CDDE40CDE540
     C3F340FE16200CCDEC40CDD740CDC640C3F340FE18200CCDEC40CD
       E540CDB740C3F340FE19200CCDEC40CDEC40CDEC40C3F340FE1A
       200CCDDE40CDD740CDDE40C3F340FE1B200CCDE540CDE540CDE540
         C3F340FE40200CCDE540CDD740CDB740C3F340FE41200CCDE540
       CDE540CDB740C3F340FE42200CCDD740CDE540CDE540C3F340FE43
         200FCDD740CDE540CDD740CDC640C3F340FE44200CCDE540CDDE
       40CDEC40C3F340FE45200CCDE540CDE540CDD740C3F340FE4637C0
         CDD740CDD740CDD740CDD740C3F340"

8  LET A=16514
9  POKE A,16×CODE A$+CODE A$(2)-476
10 LET A=A+1
11 LET A$=A$(3 TO)
12 IF A$<>"" THEN GOTO 9
13 STOP
```

RUN 2 and when the program stops in Line 13, then DELETE Lines 2 thru 13 - Inclusive.

BUFFER TABLE

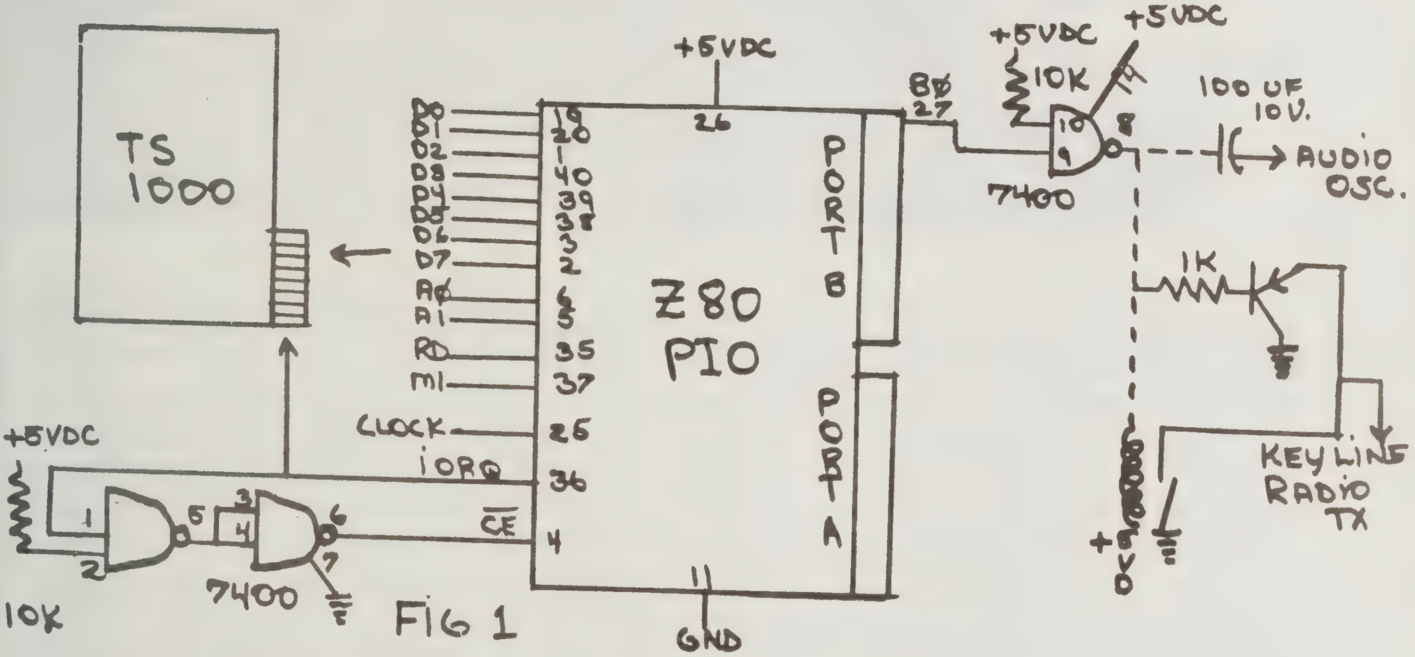
Buffer 0 = Line 10
Buffer 1 = Line 20
Buffer 2 = Line 30
Buffer 3 = Line 40
Buffer 4 = Line 50
Buffer 5 = Line 60
Buffer 6 = Line 70
Buffer 7 = Line 80
Buffer 8 = Line 90
Buffer 9 = Line 100

LISTINGS

```
10 Rem CQ CQ CQ DE WB8ADA TAN
20 Rem QTH EUCLID, OHIO ES NAME THEO TAN
30 Rem DE WB8ADA BK TAN
40 Rem TAN
50 Rem TAN
60 Rem TAN
70 Rem TAN
80 Rem TAN
90 Rem TAN
100 Rem TAN

200 LET A=USR 16514
210 STOP
```

Theo Turk, WB8ADA
161 Westbrook Drive
Euclid, Ohio 44132 CTM


TS 1000
+5VDC
D0
D1
D2
D3
D4
D5
D6
D7
A0
A1
RD
M1
CLOCK
IORQ
CE
19
20
1
40
39
38
3
2
6
5
35
37
25
36
4
26
11
Z80 PIO
PORT B
PORT A
GND
+5VDC
10K
1
2
5
3
4
6
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7400
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+5VDC
10K
+5VDC
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8
7400
100 UF 10V.
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FIG 1

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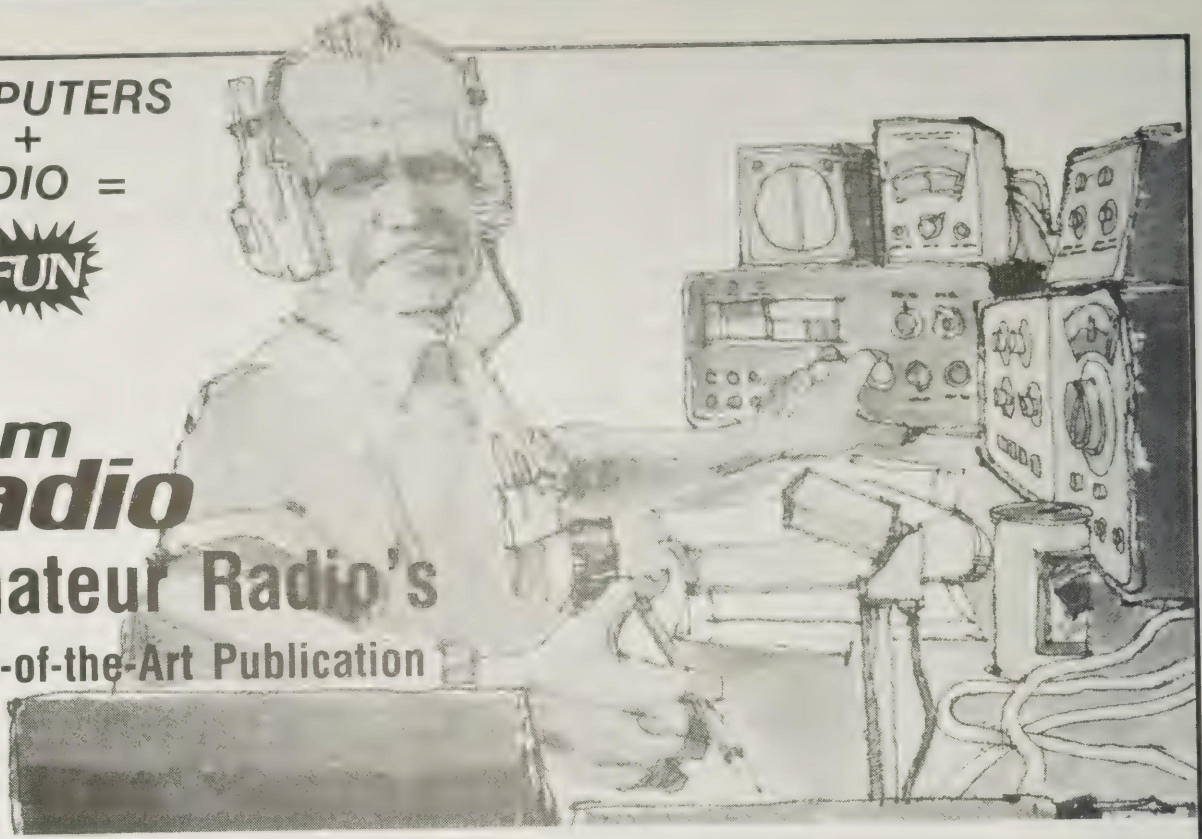

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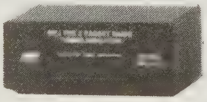

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By Steven W. Frakes, KA9QMT

Putting the Atari 800-XL on Packet

I've finally lost all marbles and jumped on the packet bandwagon. That was my thought as I took my 2nd hand TNC-1 back to the car, now all I have to do is convince my XYL that I truly NEED this item. After a lot of fast talking (and a whole lot of sweating), she even let me bring the thing into the house! The thought of her being a Tech. and able to USE this "racket-maker" didn't seem to impress her at all. But when I told her "Hey, no more interrupted meals to answer the radio, they can just leave a message on this and I'll call them back later". That was enough to convince her.

Well out came the soldering iron and the cables were made up to connect the thing to the interface, the wires went to the 2-meter rig, antenna on the rig, right? Turn the whole mess on, look at the screen and *++@'$#&()***!! Hit the return a few times and, (@&$##'()-%%*** again!! What did I do wrong?

So a call goes out on the repeater to the local "guru of computers & packet" in the area and the first thing he asks is "What computer are you using??" "Why my Atari 800-XL", I say proudly. "Oh boy, are you in trouble" he laughs, "that thing you got don't talk in ASCII". "It uses something called ATASCII!!" After all that trouble I realize, my computer even using a RS-232 won't talk to my TNC-1!! The problem with my new found toy seemed a mountain to overcome.

Now from my past experience with RTTY I knew what ASCII was, but what is this extra letter? A little reading and a whole lot of talking to a local Atari users group provided some of the answers I needed. Even though with the aid of an interface you can get an RS-232 port open to the TNC, you still need to translate the Atari language to something the rest of the world seems to understand!

So several machine language programs were acquired from this users group and tried. Line feeds seemed to be the problem. The TNC would print to the computer, but I could only type ONE command to the TNC and the stupid thing would lock up tight as my XYL's checkbook! Well, the answer MUST be in Basic!! So again I go to my local users group and here comes a ton of home brew terminal programs. After cursing the TNC, the computer, the interface, the disk drives and the IRS for last years audit, finally HEY... IT'S TALKING BOTH WAYS!!

Ok, it's called "TELMODEM. BAS" GREAT! But where are the macros and the clock and all the goodies that I see the guys with the fruit named equipment using?? I NEED those things! I'VE GOT A MONKEY ON MY BACK! So, as with many other items in ham radio, I'm going to have to do it myself. I can program, I think, at least a little, (maybe).

Welcome to the world T.N.C. Term

These programs due to their nature are left semi-finished. The reason for this is so that YOU both, the programmer AND the user, can modify them to suit the needs of your station.

The first 2 programs (TNCTERM.1 & .2) are designed for the TNC-1's. They are what I call "cmd;" orientated. That is, they are designed to work with the "cmd" prompt.

You will soon notice that such things as BEACON TEXTS, & CONNECT MACROS are only slightly filled in. Although there is plenty of room to add whatever you may choose to add. I'm sure that you neither want or need WB9DDF's call in a connect macro. (Even though he DID help me many times in the construction of these programs.)

TNCTERM.1

This program is a stand alone program. For me that means that with the aid of an Auto-start routine this program will boot and run all day long, monitor EVERYTHING! and when the memory gets full, dump it to a file called modem.text. If the power fails or you are prone to "glitches" on the power lines, like at this QTH, the computer will re-boot and start all over again. (You lose only what was in memory before the power interruption.)

TNCTERM.2

This program gives the added options of a binary language aided file sending and receiving routine. WHAT!! YOU AREN'T USING THE TAPR ROMS???

At the present time I am using a firmware version for the TNC-1 from WA8DED. I would recommend this version of AX.25 protocol to anyone wanting version

1 & 2 compatability. PLEASE NOTE: This eliminates the problem which has been evident with TNC-1's trying to digipeat version 2 protocol. These ROMs (listings available on compuserv) also free 2 more EPROM slots for additional ROM memory!!!, a real nice addition for freeing the computer for other things more important! Another free joy is multi-connects. Up to 4 connects at once plus still an unproto capability for beaconing or path checking.

TNCTERM.3

This version is the same as TNCTERM.1 except for the use of escape type commands instead of <Control> C.

TNCTERM.4

This version is the full featured version of the above.

Anybody wanting help with these programs can feel free to contact me either by mail (see address below), via packet in Central IL, or can find me at times on the Atari Micro-Computer Net 14.325 Mhz at 1600 Zulu on Sundays.

Please Note!!!!!

Please Note!!!!!

These disks are on ICD's SPARTA DOS. One of the fine features of this DOS is its use of an interrupt driven clock! The file "ZHAND.COM" & "TDLINE.-COM" are needed to use time or date options of this program and are only given on this disk to show how nice they are to incorporate in this type of program. It is my hope that if you wish to use these options you will purchase the SPARTA DOS Construction Set from ICD. Many hours and I'm sure a great deal of expense was made in the development of these fine utilities. (Their address can usually be found in ANTIC or ANALOG).

I'm at present considering a local BBS or mailbox system with the same type of setup, so if you got something in BASIC along these lines let me know! I will gladly send you a disk and cover the mailing!

73's & Happy times on packet.

Steven W. Frakes, KA9QMT
P.O. BOX 121
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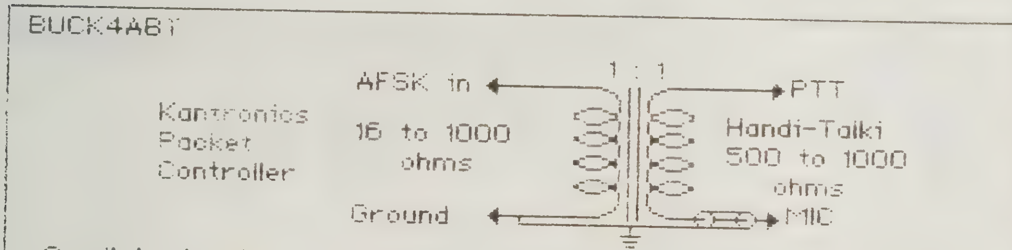
P.S. Thanks to the folks who wrote the "HomePack" Software package, I now have a modified version of "HOMETERM" that drops the line feeds and now will work with the TNC. CTM



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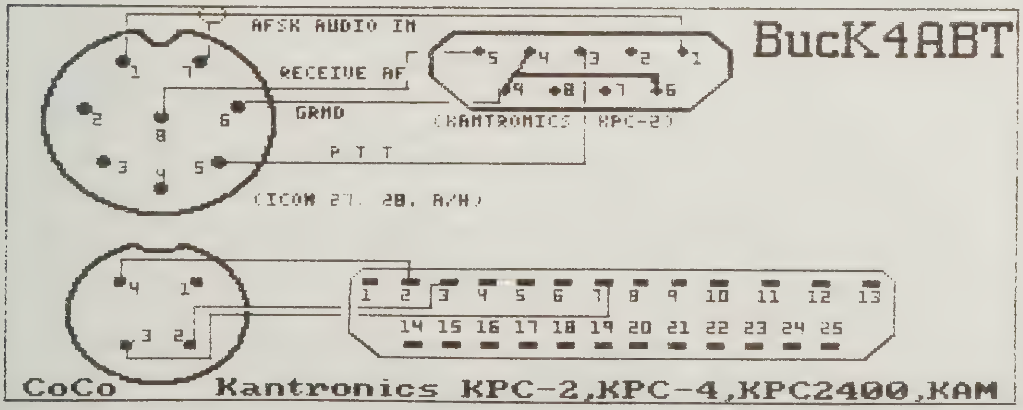

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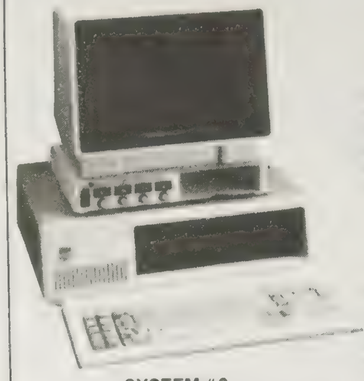

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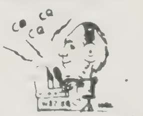

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By Gary Smith

Forth

As an AI/Expert Vehicle

William Dress has created an OPS-5 system with real-time event capture and concurrent garbage collection. Expert-2, the inference mechanism created by Jack Park, has gone through some evolutions that include a fast array version and another that embodies a discovery engine. SAVVY is a general purpose database with a probabalistic search mechanism that translates even misspelled English requests into data enquiry. Charles Duff and Norman Iverson of Kriya Systems, Inc. are marketing Neon, an object oriented, Small-Talk like product.

In addition to falling under the loose heading of representing AI/Expert efforts all of the forementioned, and more, have another common thread. That thread being the interpretive one of Forth. What will be demonstrated through a series of case-studies is that those who find themselves in the AI or Expert arena have Forth as a viable option, especially if real-time is a consideration.

Charles Duff, who feels lack of garbage collection precludes Neon as a serious AI tool is working on ACTOR, which uses incremental collection. According to Mr. Duff lack of garbage collection does not present an insurmountable obsticle to AI, but it does place a greater burden on the programmer in terms of memory allocation. ACTOR also uses a Forth-like threaded interpreter, but is more of a pure object-oriented system in that the programmer does not have direct access. Still, he contends Forth is a good way to mock up another language, and represents a perfect development tool.

William Dress, who has chaired the AI working group at the Rochester Forth Conference agrees with the need for garbage collection. It is his effort to create a real-time expert system for engineering applications that lead to Real-OPS. It must be noted to those who are new to AI that OPS-5 is Carnegie-Mellon University's world wide expert system in which such as Digital Equipment corporations's R-1 was written.

In Real-OPS, the whole expert system of OPS-5 was written in a Forth environment with all that implies, including multi-tasking and real-time event capture. This is a fully implemented OPS-5, which is based on incremental compiling in the tradition of Forth. Rules can be added and subtracted on the fly. In the regular OPS-5 rules could not be hooked back in, as they can in Real-OPS. In communicating asynchrinous external data to the expert system a mixture of defining, compiling words have been taken to give the user a way to interactively present real-time data to the OPS-5 working memory via some interrupt handling routines. At that time a rule can digest the data so the normal evolution of the expert system is altered according to real-time data.

Dr. Dress feels the newer Forths, like Forth-83, are making the symbolic processing necessary for AI more possible with their tree-like structures. String processing, which is essentially I/O dependent, included in products like Multi-Forth and Mach-I, he feels, are most helpful because they enable the switching of processing strings without really worrying about the details of which string is being talked about.

The Real-OPS implementation probably represents the first true AI-Language written entirely in Forth. Already, it is being ported to the Novix-4000, 10 MIPS+ processor, which is Charles Moore's latest contribution to the language he invented.

Charles Moore, not surprisingly, views the AI/Expert concepts in a different light. It is well to remember he was at Massachusetts Institute of Technology when artificial intelligence was still very much confined to academia, therefore his views are noteworthy.

When the question of natural languages and artificial intelligence was raised, his comment was, "Forth is a natural language.". Other languages are specialized to some particular style of programming. LISP is, for instance, optimized for the binary list. That makes it cumbersome when dealing with things that do not have to be a list. Forth, on the other hand, is not specialized to any particular feature, but is specialized in general. Any of the features characteristic of the other languages can be added to Forth, so that, in that sense, it is a higher language. That is the name of the game in

Forth. Pick the features wanted and utilize them.

He points out language marriages, like Neon, are essentially supersets of Forth. He has written many supersets of Forth; and having written them found them lacking, and returned to Forth.

Mr. Moore would not discourage others from exploring the supersets. In his view, the supersets do not simplify the problem, they merely change the approach to the problem. Of all the experiments he has performed with such supersets over a twenty year span, Forth remained the residual. Forth was the ingredient, required to make the superset go.

AI has several meanings, and the one most common at the moment, in Moore's view, is synonymous with intelligent programming. If a good job is done with the programming, and the program responds well to the stimulous it looks like it is behaving intelligently. What that may be saying is there is a lot of bad programming. He notes it is a mistake to view the need for quality programming as artificial intelligence. Once the buzz-words are past, perhaps artificial intelligence is really deterministic programming, or recognizing what to do in an emergency, when it is not entriely clear that all possible emergencies can be predetermined.

Jack Park, who created Expert-2 as a weather predictor, then released it as an AI teaching tool, uses an interesting example. He recalls the Japan Air Line plane that lost its rudder and floundered about like a great whale for some thirty minutes before finally crashing into a mountain. Jack thinks this would have been an excellent candidate for usage of a fast, array type, expert system.

He makes the point that this is not the place for a discovery engine. You want your system to determine, and cope with the problem at hand, not discovering new ways to fly, like upside down! On the ground, before the emergency ever occurs is where it would be nice to employ the discovery engine by using it in a adversary role against your expert. The discovery engine would find endless problems to present to the expert system before the problems could create another disaster in actual flight.

He has created both a fast array type expert system and a discovery engine, based on his original Expert-2. Jack has been surprised more people have not done things with Expert-2, like speed it up, or create different rules to suit their own application. He suggests a person needs to get into Expert-2, and learn what it is actually doing. Once the mechanism is understood it should then be considered from the perspective of the individual application and altered accordingly. This is excellent advice for anyone new to any programming environment.

Expert-2 falls into a class of expert systems known as personal expert consultants which emulate their human counterparts. Another example of a personal expert consultant written in Forth that has enjoyed success at the corporate level is DELTA, General Electric Company's Diesel Electric Locomotive Troubleshooting Aid.

DELTA was created to provide expert assistance similar to that of a Senior Field Service Engineer to railroad maintenance personnel to help them diagnose and repair the large variety of faults possible with a partially disabled diesel electric locomotive. The system was originally created in FRANZLISP, but implemented on a PDP 11/70 in Forth. The inference mechanism permits the user to query the system as to why a particular question has been asked, giving insight into the diagnostic procedure.

The prototype DELTA system contained approximately 400 rules in its knowledge base, and was to be upgraded to approximately 1000 rules to cover a larger spectrum of problems.

Another area where Forth has been studied in Expert systems, where real-time is a factor, is a knowledge representation coupling data collection with machine intelligence at the Sleep Research Center of Stanford University School of Medicine for sleep staging.

Perhaps a better benchmark of a language's role in a given area lies not so much in its use in the past, but rather its prospects for the future. An indication of the future of Forth in AI/Expert systems comes from the 1986 Rochester Forth Conference.

Invited speakers and their subjects were as follows:

Mr. Jack Park Toward Development of a Real-Time Expert System

Captain Steven LeClair, Wright Patterson Air Force Base - The Application of Artificial Intelligence Technology to Process Control

Dr. William Dress - Real-OPS-A Real Time Engineering Applcations Language for Writing Expert Systems

Mr.Charles Duff Development of a Threaded Object-Oriented Language

Additional papers included the following:

Fifth Generation Forth by James C. Bender of Texas Instruments, which discusses the combination of the characteristics of Forth and Lisp.

A Prescription for Real-Time Artificial Intelligence: The Low-LIPS Diet by Greg Bailey of ATHENA Programming, Inc., which considers the unsuitability of classical AI languages as vehicles for real-time artificial intelligence and ways of isolating the useful concepts embodied in those languages.

Forth for AI? by Harold Carr and Robert Kessler of the Department of Computer Science, University of Utah, which points out similarities between Forth, Lisp and Prolog and how Forth may be a useful delivery vehicle in AI research for well understood problems.

Systems That Have Some Ideas Instead of Rule Based Knowledge by Rene' Hever, which discusses a fast array represented in ideas.

A Survey of the Characteristics of Very High Level Languages by Regis S. Loffman of the Energy Division, Oak Ridge National Laboratory in which an understanding of very high level languages provides a contest into which Forth and AI languages may be placed for evaluation.

Use of a Forth-Based Prolog for Real-Time Expert Systems by William H. Paloski, Louis L. Odette, and Alfred J. Krever of Technology Incorporated, which discusses the development of a frame/rule-based expert system to serve as the astronaut interface for a series of vestibular investigations aboard the IML-1 Spacelab mission.

Real-Time Interpretation of Satellite Data by Henry Harris of Jet Propulsion Laboratory, which features an implementation of Prolog in Forth.

Object Oriented Programming in a Forth-like Programming Environment by Paul Snow and Cliff Click, which highlights the advantages of Forth over conventional languages when implementing a object oriented programming environment.

This is by no means, all the papers presented concerning Forth in AI, nor is this article an exhaustive study of all such efforts to present. One theme remains constant throughout; and that is Forth is not only a viable option in AI/Expert systems, but where real-time is a consideration perhaps the legitimate language of choice.

Gary Smith
Founder and continuing coordinator for the Central Arkansas chapter, Forth Interest Group
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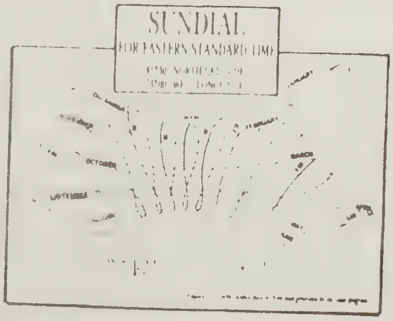

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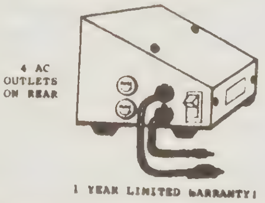

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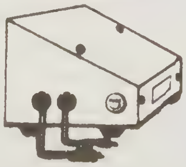

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By Jim Hale, AsO

Amateur Satellite Observers

Many reports of sightings of Mir and the propulsion or service module from Kvant. But the most interesting report comes from Imre Auersbacher of New Jersey. He heard the voices of the cosmonauts on his scanner!

Imre has a Bearcat hand held 100XL with only an 8 inch "Rubber Duckie" antenna! He reports hearing both parts of a conversation in Russian. The other part was apparently from the ship off Nova Scotia. The Mir signals (143.625) were strong as long as it was above the horizon. The signals from the ship were apparently reaching him by "skip" or reflection. The conversation was heard on almost any pass except after 16:00 EDT. Imre can't understand Russian but might tape the conversation if anyone can translate it to English. The scanner is reported to work better if placed on a large metal object like a table, or refridgerator. Outside the hood of a car might work to strenghten the signal as well. He plans to buy an antenna and hopes that will bring in weaker satellite signals.

He also reports signals received from several other satellites. NOAA-9 on 137.620, NOAA-10 on 137.500, Meteor 2-15 on 137.850, and Arybhata on 137.440 Mhz. The latter was a silent carrier frequency that clears the static but the rest sounds like a tinkling bell combined with a ticking clock. At a power of only 5 watts these satellite can be heard from 2500-3000km with a hand held portable scanner with an 8 inch antenna. Thats enough to push me into spending $89.95 for the Bearcat 140 base unit scanner. I hope to begin monitoring this month!

Anyone who has confirmed frequencies and satellites please send them in to AsO so I can try them and report them. Also would like to know the formula for cutting the right length of wire to make dipole antenna for 137. and 143. Mhz etc.

I was reading about the early Burner rockets used in the DMSP and other launches. After seeing the Radsat rocket (72.760) flash up to naked eye brightness last year I wanted to know more. The first DMSP satellite. were small (82kg) and the Burner 2 rocket was used. it was the Thiokol TE-M-364-2 orgininally developed for the surveyor program. The Burner 2 was 165X173 cm. The Block 5A DMSP satellite. were the last to use the Burner 2. The Block 5B satellite. were twice as massive and the burner 2A was developed. It was 157X191 cm and had tow stages. There are several examples of these two types in the elements section. I wonder if any of them are putting on a show like 72.760? The payloads get larger after Oct 14, 71 so look for these differences too. Found this information in an old issue of "Spaceflight".

There has been another failure in the Russian space program. This combined with the Ariane and Atlas/Titan/Shuttle problems has left the worlds space powers in a bad way. In the May 4th AWST they say the April 24 launch the proton fourth stage shut down early and left Cosmos 1838/39/40 in a useless orbit. There was a successful Proton launch on March 19 and they thought they had the problem fixed after the January 30th Proton failure. The new failure left several interesting objects in orbit. The 3.9X3.9 stage 1987-36G will make several good passes over N. America in June. Presumably the fairly large C-1838/39/40 statellite will be nearby. There is a good pass on the 15th and the 20, and 23rd.

There are two Centaur 8.6X3 meter rockets that you may want to look for in June/July. The Fltsatcom 4 rocket 80.87B makes a good pass on June 19th and the Intelsat 5-3 rocket 81.119B on July 4th. Look for more... Another "eccentric case" PRC-14 (China) will make good North American passes. There is a very good one on June 23rd. Its a naked eye object at perigee so it should be easy in 7X50 binoculars Good luck...

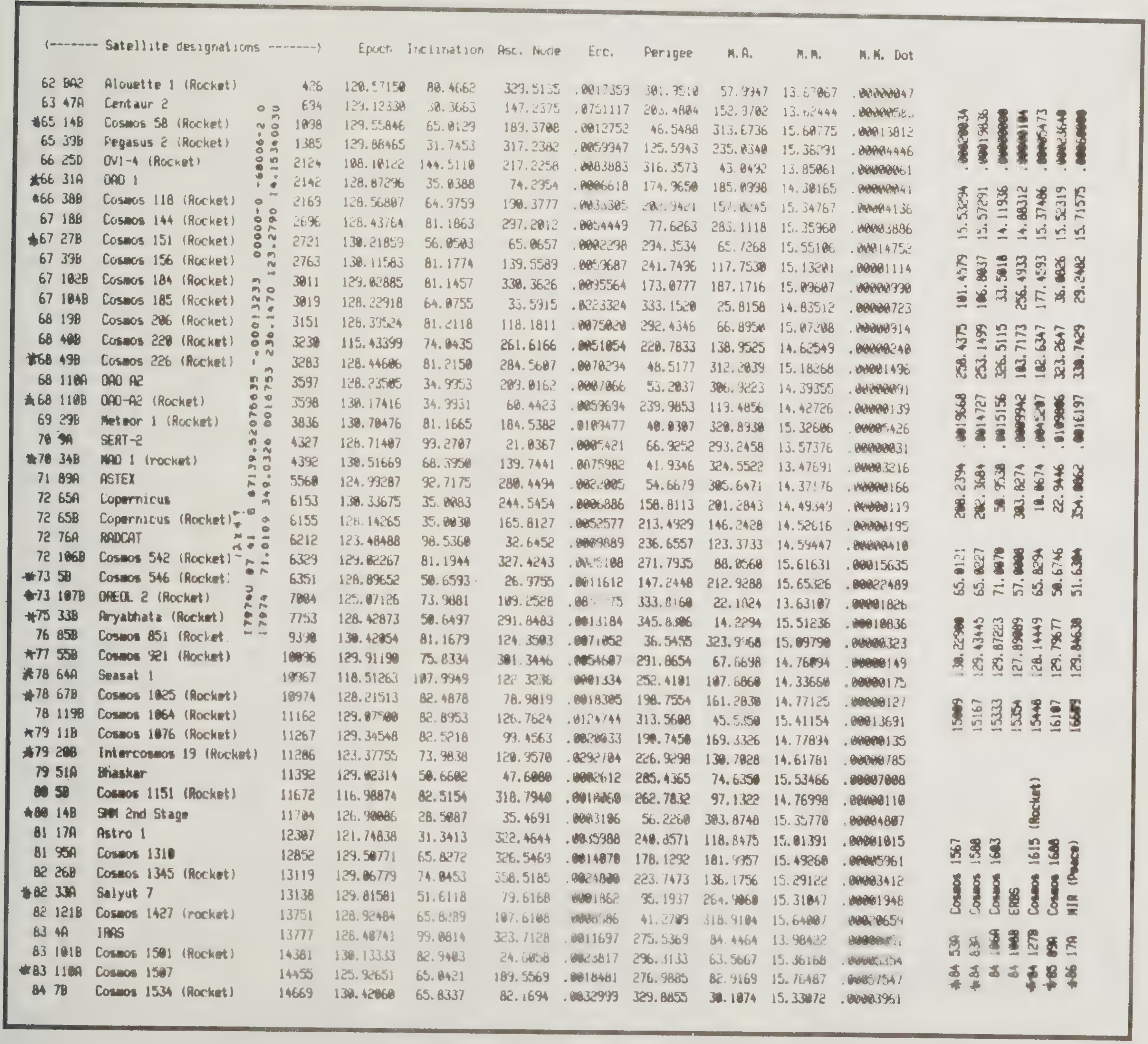
Last December I saw the Fltsatcom 4 Centaur rocket 80.87B and reported it in January AsO. I saw it the other night at 8000km range in binoculars Its got the same flash period as before, 4.25 seconds. It is in my "window" May-August, and can be seen at higher latitudes when it's at high alt. At lesser latitudes the low passes will be spectacular! At apogee it reaches 12407km at perigee try 232km!! It's in a 26 degree inclination so if you are at that latitude, or less, (north or south) you can have a direct overhead pass like this. The low passes aren't above the horizon for folks with much highter latitudes than ±26. Run their elements and see if you can find it for fun.

My time was eaten up by the farm work and I fall asleep at dark, so I haven't seen many satellites. But my orchard has trippled in size, and has it first fruit!

Cosmos 100 was launched in Dec 1965 and is 5X1.5 with two solar arrays. It is normally 4th magnitude but can flash up to at least 2.5 magnitude In its 65 degree orbit it can be seen by everyone.

Cosmos 1300 is another of those 82 degree/97 minute orbit satellites I have been curious about. Reading the work of Nicholas Johnson I find that they are either electronic intelligence or oceanographic payloads. These can reach 3rd magnitude when sun/earth/observer angles are just right. Cosmos 1427 is described as a 4X2 cyl. by the RAE Tables. It also was 4.5 magnitude on a poor angle. I hope to catch it (or one like it) in a better angle to see how bright it might get. The Landsat 5 is 4X2 meters with solar array. It is tumbling now and flashes every 2-3 seconds up to 4th magnitude It will be in the window until late August.

On May 30th 21:01.33 I saw 87.45A at my zenith heading south. Its orbit is like a recoverable photo recon. resources satellite launched in 1986. The lifetime is expected to be 14 days. Its so new I don't have a Cosmos number on it. In a good library look for a copy of the works of Nicholas L. Johnson, if your're interested in the Russian space program. Also the publication, "Spaceflight" put out by the British Interplanetary Society. Look for copies of Aviation Week and Space Tech. magnitudeazines. I wish I could afford it.



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 (------- Satellite designations -------)        Epoch  Inclination  Asc. Node    Ecc.     Perigee      M.A.       M.M.      M.M. Dot

  62 BA2   Alouette 1 (Rocket)            426  120.57150   80.4662  329.5135  .0017359  301.3510   57.9347  13.67067  .00000047
  63 47A   Centaur 2                      694  129.12330   30.3663  147.2375  .0751117  203.4804  152.9702  13.62444  .00000058
 *65 14B   Cosmos 58 (Rocket)            1038  129.55846   65.0129  183.3700  .0012752   46.5488  313.6736  15.60775  .00013812
  65 39B   Pegasus 2 (Rocket)            1385  129.88465   31.7453  317.2382  .0059947  125.5943  235.0340  15.36291  .00004446
  66 25D   OV1-4 (Rocket)                2124  108.10122  144.5110  217.2258  .0083883  316.3573   43.0432  13.85061  .00000061
 *66 31A   OAO 1                         2142  128.87296   35.0388   74.2354  .0006618  174.9650  185.0398  14.30165  .00000041
 *66 38B   Cosmos 118 (Rocket)           2163  128.56807   64.9759  190.3777  .0033305  202.9421  157.0245  15.34767  .00004136
  67 18B   Cosmos 144 (Rocket)           2696  128.43764   81.1863  297.2012  .0054449   77.6263  283.1118  15.35960  .00003886
 *67 27B   Cosmos 151 (Rocket)           2721  130.21859   56.0503   65.0657  .0002298  234.3534   65.7268  15.55106  .00014752
  67 39B   Cosmos 156 (Rocket)           2763  130.11583   81.1774  139.5589  .0059687  241.7436  117.7530  15.13201  .00001114
  67 102B  Cosmos 184 (Rocket)           3011  129.02885   81.1457  330.3626  .0035564  173.0777  187.1716  15.03607  .00000390
  67 104B  Cosmos 185 (Rocket)           3019  128.22918   64.0755   33.5915  .0223324  333.1520   25.8158  14.83512  .00000723
  68 19B   Cosmos 206 (Rocket)           3151  128.33524   81.2118  118.1811  .0075020  292.4346   66.8950  15.07208  .00000914
  68 40B   Cosmos 220 (Rocket)           3230  115.43399   74.0435  261.6166  .0051054  220.7833  138.9525  14.62549  .00000240
 *68 49B   Cosmos 226 (Rocket)           3283  128.44606   81.2150  284.5607  .0070234   48.5177  312.2039  15.18268  .00001436
  68 110A  OAO A2                        3597  128.23505   34.9953  203.0162  .0007066   53.2037  306.9223  14.39355  .00000091
 *68 110B  OAO-A2 (Rocket)               3598  130.17416   34.9931   60.4423  .0059694  239.9853  119.4856  14.42726  .00000139
  69 29B   Meteor 1 (Rocket)             3836  130.70476   81.1665  184.5382  .0109477   40.0307  320.8930  15.32606  .00005426
  70 9A    SERT-2                        4327  128.71407   99.2707   21.0367  .0005421   66.9252  293.2458  13.57376  .00000031
 *70 34B   MAO 1 (rocket)                4392  130.51669   68.3950  139.7441  .0075982   41.9346  324.5522  13.47691  .00003216
  71 89A   ASTEX                         5560  124.99287   92.7175  280.4494  .0022005   54.6679  305.6471  14.37176  .00000166
  72 65A   Copernicus                    6153  130.33675   35.0083  244.5454  .0006886  158.8113  201.2843  14.49349  .00000119
  72 65B   Copernicus (Rocket)           6155  128.14265   35.0030  165.8127  .0052577  213.4929  146.2428  14.52616  .00000195
  72 76A   RADCAT                        6212  123.48488   98.5360   32.6452  .0009889  236.6557  123.3733  14.59447  .00000410
  72 106B  Cosmos 542 (Rocket)           6329  129.02267   81.1944  327.4243  [illegible]  271.7935   88.0560  15.61631  .00015635
 *73 5B    Cosmos 546 (Rocket)           6351  128.89652   50.6593   26.3755  .0011612  147.2440  212.9288  15.65326  .00022489
 *73 107B  OREOL 2 (Rocket)              7004  125.07126   73.9881  109.2528  [illegible]  333.8160   22.1024  13.63107  .00001826
 *75 33B   Aryabhata (Rocket)            7753  128.42873   50.6497  291.8483  .0013184  345.8306   14.2294  15.51236  .00010836
  76 85B   Cosmos 851 (Rocket            9390  130.42054   81.1679  124.3503  .0071052   36.5455  323.9968  15.09790  .00000323
 *77 55B   Cosmos 921 (Rocket)          10096  129.91190   75.8334  301.3446  .0054607  291.8654   67.6698  14.76094  .00000149
 *78 64A   Seasat 1                     10967  118.51263  107.9949  122.3236  .0001334  252.4101  107.6860  14.33660  .00000175
 *78 67B   Cosmos 1025 (Rocket)         10974  128.21513   82.4878   78.9819  .0018305  198.7554  161.2830  14.77125  .00000127
  78 119B  Cosmos 1064 (Rocket)         11162  129.07500   82.8953  126.7624  .0124744  313.5600   45.5350  15.41154  .00013691
 *79 11B   Cosmos 1076 (Rocket)         11267  129.34548   82.5218   93.4563  .0020033  190.7450  169.3326  14.77834  .00000135
 *79 20B   Intercosmos 19 (Rocket)      11286  123.37755   73.9838  120.9570  .0292704  226.9298  130.7028  14.61761  .00000785
  79 51A   Bhaskar                      11392  129.02314   50.6602   47.6000  .0002612  285.4365   74.6350  15.53466  .00007008
  80 5B    Cosmos 1151 (Rocket)         11672  116.98874   82.5154  318.7940  .0010060  262.7832   97.1322  14.76998  .00000110
 *80 14B   SMM 2nd Stage                11704  126.90006   28.5087   35.4691  .0003186   56.2260  303.8740  15.35770  .00004807
  81 17A   Astro 1                      12307  121.74838   31.3413  322.4644  .0015988  240.8571  118.8475  15.01391  .00001015
  81 95A   Cosmos 1310                  12852  129.50771   65.8272  326.5469  .0014070  178.1292  181.9957  15.49260  .00005961
  82 26B   Cosmos 1345 (Rocket)         13119  129.06779   74.0453  358.5185  .0024000  223.7473  136.1756  15.29122  .00003412
 *82 33A   Salyut 7                     13138  129.81581   51.6118   79.6168  .0001862   35.1937  264.9060  15.31047  .00001940
  82 121B  Cosmos 1427 (rocket)         13751  128.92484   65.8289  107.6108  [illegible]   41.2709  318.9104  15.64007  .00020654
  83 4A    IRAS                         13777  128.48741   99.0814  323.7128  .0011697  275.5369   84.4464  13.98422  [illegible]
  83 101B  Cosmos 1501 (Rocket)         14381  130.13333   82.9403   24.6858  .0023817  296.3133   63.5667  15.36168  [illegible]
 *83 110A  Cosmos 1507                  14455  125.92651   65.0421  189.5569  .0018481  276.9885   82.9169  15.76487  .00057547
  84 7B    Cosmos 1534 (Rocket)         14669  130.42060   65.8337   82.1694  .0032999  329.8855   30.1074  15.33072  .00003961

         12x4?
         17974U 87 41   B 87139.52076635 -.00013233  00000-0 -68006-2 0
         17974  71.0109 349.0326 0016753 236.1470 123.2790 14.15340030

 *84 53A   Cosmos 1567                  15009  130.22900   65.0121  208.2394  .0019668  258.4375  101.4579  15.53294  .00020034
 *84 83A   Cosmos 1588                  15167  129.43445   65.0227  202.3684  .0014727  253.1499  106.8037  15.57291  .00019836
  84 106A  Cosmos 1603                  15333  129.87223   71.0070   50.9538  .0015156  326.5115   33.5018  14.11936  .00000000
  84 108B  ERBS                         15354  127.89009   57.0000  303.8274  .0009942  103.7173  256.4933  14.88312  .00000104
 *84 127B  Cosmos 1615 (Rocket)         15448  128.14449   65.8294   10.0674  .0045207  102.6347  177.4593  15.37486  .00005473
 *85 89A   Cosmos 1688                  16107  129.79677   50.6746   22.9446  .0109806  323.2647   36.0826  15.52319  .00023640
 *86 17A   MIR (Peace)                  16609  129.84638   51.6304  354.0062  .0016197  330.7429   29.2482  15.71575  .00060000
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* COSMOS 1500   137.4   4.2 mag.
14372U 83 99   A 87147.02202161  .00000671  00000-0  99999-4 0
14372  82.5450   3.9954 0022217 251.0896 108.7833 14.74218351
* PRC 14     2.4X2 meters
14070U 84  8   A 87145.52653596  .00000190  00000-0  21873-3 0
14070  36.1101 270.1217 3075799  31.1309 343.9774  8.81388810
* COSMOS 1567     1st mag.
15009U 84 53   A 87148.38188524  .00021983  00000-0  33951-3 0
15009  65.0128 146.7090 0019331 255.1313 104.7714 15.53917978
* COSMOS 1528     0 mag.
15167U 84 83   A 87147.41140595  .00026993  00000-0  35785-3 0
15167  65.0198 191.0789 0014319 258.6088 101.3497 15.58075681
* COSMOS 1601   4X2 meters
15320U 84104   A 87146.87935965  .00003563  00000-0  14294-3 0
15320  65.8366 314.1649 0017939 140.5769 219.6641 15.2051989414
* COSMOS 1602   3.5X.9 WINDmill OCEANOGRAPHIC 137.40
15331U 84105   A 87146.85457676  .00000209  00000-0  30254-4 0
15331  82.5348 311.2043 0020180  13.1645 347.0236 14.7361781414
* COSMOS 1607   REACTOR SEPERATED
15378U 84112   A 87145.39970400  .00000075  00000-0  99999-4 0
15378  64.9907 261.3641 0045416 343.0306  16.9223 13.83116073
* NOAA 9   137.62 - 137.77   3.7X1.9X6.4
15427U 84123   A 87145.48733571  .00000118  00000-0  75253-4 0
15427  99.0492 110.9378 0014688 272.2419  87.7073 14.11496639
* COSMOS 1615   4X2 meters
15446U 84127   A 87145.74773776  .00001543  00000-0  48972-4 0
15446  65.8248 322.8349 0035336 171.0488 189.1294 15.34098047
* COSMOS 1631   4X2
15584U 85 18   A 87139.68782354  .00000977  00000-0  41062-4 0
15584  65.8499 301.7114 0036577 228.8848 130.9134 15.25980512
* COSMOS 1646   1st MAG?   166.0 MHZ.
15653U 85 30   A 87148.11182322  .00018533  00000-0  34560-3 0
15653  65.0302 159.6943 0024085 270.3419  89.5256 15.48582105
* COSMOS 1660          150.30 MHZ.
15821U 85 47   A 87147.54904469 -.00000007  00000-0  00000 0 0
15821  73.6257 195.6899 0027235 340.7290  19.2715 12.40630557
* COSMOS 1707   ELINT   153.420
16326U 85113   A 87146.93977316  .00000059  00000-0  73706-5 0
16326  82.5380 217.8575 0023194 357.5692   2.5365 14.73744977
* ITV 1
16328U 85114   A 87148.03899496  .00014239  00000-0  21553-3 0
16328  37.0718 357.1331 0297732 186.6147 173.1293 15.16786454
* ITV 2
16329U 85114   B 87140.92302406  .00331058  00000-0  25209-2 0
16329  37.0057 341.1276 0162512 210.7961 148.3346 15.55069704

16330U 85114   C 87146.97961829  .00038138  00000-0  44949-3 0
16330  37.0765 330.9946 0236879 221.9017 136.4200 15.33435928
* COSMOS 1680   2X1 CYL. (store dump) 153.62 < 1 WATT
16011U 85 79   A 87147.67275358  .00000241  00000-0  99999-4 0
16011  74.0453  35.3501 0015991 135.2405 224.9983 14.28922715
* COSMOS 1682   1.8X1.5 ?
16107U 85 89   A 87141.89766380  .00013370  00000-0  17094-3 0
16107  50.6722 321.4767 0109188  12.0902 348.2656 15.52687604
* COSMOS 1704   1.3X1.7, 149.940
16291U 85110   A 87147.74099300  .00000099  00000-0  99999-4 0
16291  82.9340 250.3461 0030947 195.0647 164.9587 13.73479147
* meteor 2-13   5X1.5meter 137.3 MHZ
16408U 85119   A 87146.84426608  .00000006  00000-0  00000 0 0
16408  82.5339  27.9670 0014677 251.7280 108.2289 13.84010650
* COSMOS 1726   ELINT 153.480 < 1 WATT
16495U 86  5   A 87142.03100828  .00000188  00000-0  28510-4 0
16495  82.5301 162.1691 0024658 115.8713 244.5038 14.74411753
* COSMO 1727   1.3X1.7   15[illegible] MHZ
16510U 86  8   A 87140.82192455  .00000267  00000-0  27618-3 0
16510  82.[illegible]502  74.1832 0039081   6.6201 353.5426 13.72981365
* COSMOS 1733   ELINT   153.420 < 1 WATT   4.5 mag.
16611U 86 18   A 87142.04428615  .00000178  00000-0  25238-4 0
~~16611  82.5174 101.3508 0021201 190.1088 163.9431 14.74349208~~
```

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* COSMOS 1809   5X1.5
17241U 86101   A 87146.91596092  .00000078  00000-0  67089-4 0
17241  82.5276 106.8690 0015040 186.6881 173.4047 13.82400172
* COSMOS 1810       7X2.4 meters
17202U 86102   A 87147.91606507  .00129743  13315-4  17296-3 0
17202  64.7337  88.6961 0037286  83.8358 276.7953 16.05007067
* COSMOS 1815
17320U 87  7   A 87147.92437656  .00009446  00000-0  15924-3 0
17320  50.0688 253.8192 0144474 286.1936  72.3345 15.41544931

* SPOT 1     1.8X1.8X4.7
16613U 86 19   A 87144.80421548  .00000128  00000-0  69199-4 0
16613  98.7319 219.1455 0001608 116.6184 243.5010 14.20017344
* [illegible]   ELINT   158.480 < 1 WATT
16791U 86 40   A 87146.95928094  .00000451  00000-0  67351-4 0
16791  82.4803  34.5826 0026952 239.5335 120.3280 14.73534937
* [illegible] 17[illegible]   1.3X1.9   149.940
16798U 86 47   A 87146.91232569  .00000006  00000-0  00000 0 0
16798  82.9226 342.1824 0020418  46.2045 314.0698 13.73808000
7970U 87 42    A 87149.44342708  .02145519  19450-4  65928-3 0
7976   70.3857 31[illegible].5175 0048333  27.1914 332.9855 16.23141236

* COSMOS 1818   MANOEUVRABLE
17369U 87 11   A 87147.93269251  .00004011  00000-0  16100-2 0
17369  65.0106 198.3201 0010011 280.6557  79.3373 14.29199229
     ASTRO 3 RKT JAPAN   2.7X1.5
17481U 87 12   B 87146.77487033  .00000579  00000-0  44471-4 0
17481  31.0885 302.4046 0117280  57.1636 304.0235 14.92146632
* MIR                143.625 MHZ
16609U 86 17   A 87147.90466735  .00042574  00000-0  32362-3 0
16609  51.6335 261.0642 0010608  38.3564 321.6378 15.71674836
* MOS 1 RKT JAPAN   6X2.4 meters
17528U 87 18   B 87141.13350172  .00000072  00000-0  28705-4 0
17528  97.4532 199.2778 0184194 231.6967 126.7834 14.36616296
     COSMOS 1835   TRY 240 MHZ   7X2.4
17649U 87 32   A 87147.88708511  .00597715  35348-4  22791-3 0
17649  64.7457 223.5336 0077685 111.1941 249.7754 16.16327158
     KVANT   SVC. MOD.   BRIGHT
17851U 87 30   C 87147.97930876  .00002077  00000-0  29885-4 0
17851  51.6295 205.1668 0017817  50.9992 309.2731 15.58835191
```

Until next time…
Jim Hale, AsO

HCR 65
Box 261-B
Kingston, Arkansas 72742 **CTM**

Your Letters

Liked the Clone Articles

Chet:

I really enjoyed this issue of the **CTM** Magazine. I found the articles about Building a Clone and A Close Look At a Clone to be of particular interest to me. I would have liked a little more specific detail such as specific problems that the author encountered while BUILDING his Clone, ie. did all of the hardware fit properly or did he have to make minor or major adjustments for the boards to fit together and in the system box, did he short out a drive or system board, etc. He was very specific as to the time effort required and the fact that the documentation was severly lacking. This is of critical importance to someone like myself who is not an expert in hardware or those type of things. My area is software and systems design. None-the-less, I would like to tackle a project like that and am very interested in the problems that a novice like myself might encounter. The price is right but I don't relish the thought of spending $500 or so to play with an expensive erector set that might become a pile of chips, wires, nuts and bolts piled up in the corner. Thought you might find my response of interest. I might even tackle one of these sometime soon.

Bob Slaughter
Birmingham, AL

Thanks for the comments Bob. I have had several other comments about the articles, none as thorough as yours. We are now looking for another clone to run test and do a series of articles on. Your comments will be of help to that reviewer. I have a couple of clones people spotted and will be talking to them soon. These articles will be a much more in-depth series covering the items you mentioned and many many more. It's just a matter of time until I strike the right bargain with the right company.

We are also planning on doing a book on building a clone with step by step instructions as well as instructions to use the clone. This is in the works but it will take several months to complete such a detail project.

*We all want to make **CTM** the very best source of information for our readers in as many areas as we can. You could help by writing for us with your knowledge you could help a lot of people. Thanks for taking time to write and I hope to see an article from you soon... Chet*

New Subscriber needs help

Sirs,

Please accept my subscription for **CTM.**

I also need help in setting up a Kantronics KPC-2400 with an Apple IIc. The modem software I currently use is ASCII Express Pro Apple DOS 3.3. I have been unable to configure this program for use with the KPC-2400. I would appreciate any help you or anyone your know may be able to give.

I am looking forward to my first copy of **CTM** and any assistance you are able to give.

73's
John D. Freed, KE4CH
216 Maplewood Drive
Clarksville, TN 37042-3338

*John, thanks for the subscription and I have included your complete address so you will get answers from the **CTM family.** With your subscription you didn't just subscribe to a magazine, you joined a family of readers who love to help each other. I bet you will receive more than one answer to your problem. That is one of the main reasons for **CTM** , to help and get help from our subscribers and readers.*

As you become familiar with the way things go, I am sure you will feel more comfortable as most of our other subscribers do. Because we are sall, we can do things other magazines only read about and wish they could do.

I hope you will be happy with CTM and will tell your friends about us.

Thanks again for the sub and welcome... Chet

Mobile RTTY?

Chet,

Thank you very much for the back issues of **CTM.** Enjoyed the articles very much and the one about the portable C-64 was just what I needed.

Also enjoyed the article on California Earthquate (up coming). Having worked in California for some years and felt several small "Quakes", all I can say is, "The people back here in the East don't know what they are missing (?)".

I hate to write a check for a dollar and a half so am enclosing a check for a full subscription.

Please keep up the good work. I love my C-64's and now "I won't have to leave home without them". RTTY mobile anyone?

73!
Gene Yost, W2FMN
Wyckoff, NJ

*Gene, glad you like the back issues of **CTMs** and thanks for the subscription. There are so many things coming in the next few months, you just can't imagine the fun you will have in the very near future. I know you will enjoy what coming.*

*Yes, we have had so many fine comments on Bob Hoovers' article "The California Earthquate" and also his conversion of the C-64 to 12vdc. Bob has real talent and he wants to share his vast knowledge with the **CTM** family. Glad to have you as one.*

Remember you get a free classified ad each month. So send them in and rid your self of excess equipment others family members want.

Take care and God Bless... Chet

New Subscriber Likes CTM

May 25, 87
Dear Chet:

I attended the Knoxville hamfest for the major expectation of upgrading my two month old Novice licence to General. This I accomplished. in addition to that activity, I ran into two of my "mentors" (hams for many years). I told them of my successful upgrade and my recent assemblage of a PC clone and how I was (still) interested in interfacing the micro with my transceiver. They suggested I go to your booth. Since that time, all of the diverse questions in my mind have been answered - plus some! I like your magazine.

I have been programming, chiefly in BASIC, for about six years and currently develop software as a trade. Computers being my first interst and radios close behind! HI.

Anyway, I wanted to submit some titles for your column and am highly interested in contributing to your magazine on an occasional basis and would probably be a likely candidate for software review (Running MS-DOS W/640K RAM & 10M HD AT 8MHz).

Here are the titles I came up with:

1. Chet To Mainstream
2. Connected To Mainstream
3. Contact The Mainstream

I had others; however, these just seem to fit the column and I particularly think the word "Mainstream" does justice in describing the attributes of your readers. I thought about wome "WDR" titles, but I thought that carrying the "**CTM**" on would best suit continuity and mental impression.

Enclosed is my sub fee to hemp "Continue The Magazine" and thanks for taking the time to read this.

73's
Tom Warner, KB4YCF/AG
Dayton, TN

Tom, thanks so much for the letter, the comments, the suggestions for my "Chats" and your subscription.

*Your mentors were absolutely right, reading **CTM** will answer many questions hams have and some they haven't even thought of. That goes for those without their ham ticket. Our writers write not only from their experience but from their hearts. Many of them have been in the same spot as you and have a good idea of where your thoughts are.*

Tom, please send in your articles whenever you have them ready. With your help in writing I am sure you will become a mentor in your own right.

Thanks for your suggestions for my editorial column each month. With yours, we now have several to consider. I hope to be able to rename the column next issue if possible, the following month for sure.

*And finally thanks for your subscription. Show your copies to your friends and let the see just how valuable **CTM** can be for them. But, don't let them read it each month, make them buy their own subscription. Chet*

Another Reason why we don't have more Timex/Sinclair advertisers

Dear Mr. Lambert

In regard to your "PRESS Releases" in the March 1987 edition of **CTM** I have to say that you do not understand the position of the TS dealers who are supposedly "leaving me with blank pages." First of all the TS community appreciates any attention it can get in a magazine, especially after the departure of Timex from the computer market, but you must also realize the following: First, you run a specialty magazine, while it may appeal to Ham/TS users it may not have the same attractiveness to a TS machine code hacker. Secondly, the TS community is made up of mostly hackers. Lastly, the majority of dealers who have already taken substantial financial losses by supporting the Sinclair machines can not afford to advertise in a magazine not dealing with the main portion of their customers, especially if this magazine, **CTM** namely, charges roughly twice the amount of the leading Timex Sinclair magazine. It may well be that you have a very fine magazine, and considering this you should easily be able to fill those pages which Sinclair dealers can't afford. In any case I thank you for your continued support of the Sinclair line. No one will ever get rich off this computer (except Clive Sinclair) but you will find that with the more support you deliver, the more respect you will receive.

Sincerely,
Jon Roketenetz
Cincinnati, Ohio

Jon, I do appreciate you taking time to write. I can't however, agree with all you say. You and I are biased in our opinon concerning TS advertising in **CTM.** *Since I can't find your name on my subscriber list and I am not familiar with your company, I can only surmise you have gotten your information from a friend or two and perhaps not personally. If you had either first hand knowledge or at least better knowlede you may change your thinking.*

I didn't really have time to do what I did to answer your letter but I took the time anyway. I will probably get letters condeming me for taking the time. Regardless, I think your letter deserves a reply.

From the tone of your letter I don't think I can look forward in getting an ad from you. I would guess and I may be wrong, and I hope I am, but I would guess you may be one of the type people I have been talking about.

I started covering the Timex Sinclar computers in December 1982 and I haven't stop giving good and decent coverage to them and of this writing, I don't intend to. From December 1982 until December 1985 we had a total of ***178 articles*** *on the entire Timex family from the ZX-80 through the QL.*

During last year, 1986 we had a total of ***68 articles with a total of 148 pages of text*** *that doesn't count any advertising, only text diagrams and listings.*

This year, 1987 we have had a total of ***22 articles with a total of 58 pages of text*** *. This gives us a total of* ***268 articles for the full period of time and 206 pagers of text for the last 17 months.*** *I just didn't have time to count the pages of the 178 articles from December 1982 through December 1985.*

I don't think any other magazine can match that record. Our writers are second to none and that includes the one writing on the Timex/Sinclair family of computers.

I don't agree with your statement that I "run a specialty magazine" totally. Yes, I do from some standpoints that is true. I am not sure all T/S owners are "hackers". It is partically true to be sure but I get letters from many who just want to get the basics. Of course they do increase in their knowledge as time goes by. We are a specialty magazine from the standpoint we cover using computers in the ham shack. But, we have many articles of pure computer interest.

From what I am told my numerous T/S owners and subscribers they like and subscribe to **CTM** *because we do cover more than just the T/S computers. Many, if not most of them have other computers they use and* **CTM** *just happens to cover those computers.*

Another thing I didn't count were the type of articles of a generic substance but where people gain valuable information regardless of the type of computer. For example those articles on keeping your computer clean, protecting them from lightening, service and maintenance of the computer, buying the proper disk and getting your moneys worth from them, learning of electronics etc. I am sure if I used the index of the various issues I could get more subjects.

This is one think that sets us apart from the other magazines. Our information is of value in numerous areas.

Another interesting point is now that I am taking over T-S Horizons , this, I believe will give me the largest number of T/S subscribers of those remaing T/S publications.

It may be true that my ad rates are somewhat higher, perhaps twice the cost, over some publications.

Until another magazine starts up or others become a monthly publication, I believe we are the ***only monthly magazine covering T/S computers.*** *Yes, There is the survival column in Computer Shopper written by a fantastic writer, Mark Fendrick. That is usually about 2 or so of our pages each month. Again, that publication covers more than just the T/S computers. I doubt there are too many subscribers to CS just for the information on the T/S computers. I may be wrong but only those subscribing to CS could tell .*

Another interesting point is that in my calculations of the number of pages did not include those questions and answers through our "Letters" column. Our column is somewhat different than most in that, we coverr problem areas there where a person can write in and let our subscribers know of their problem and the answer is printed in **CTM.**

I could go on with more but I have covered it before in previous issues and I don't need to do so.

And one final comment which refers to your last sentence. I think I have the "respect" from my subscribers, advertisers, the few I have, I wonder. Regardless I am not looking respect immediately that comes with results. I am more interested in the immediate need and that is of advertisers to keep us going.

When I said in previous issues I would deminish my coverage of the T/S computers if I didn't get more support from advertisers, I got many , many letters from subscribers and some advertisers or potential advertisers. I suspect I will get more letters on this reply to you, but at least one most important things comes from the letters regardless of their viewpoint and that is people both subscribers and friends of theirs ***read CTM.*** *So from the number of letters I get many of them are from T/S subscribers. Get some of the back issues and check it out for yourself.*

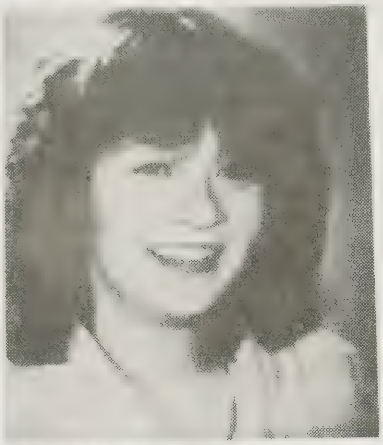
I may not have expressed myself as good as I perhaps should but shortness of time dictates this reply.

It isn't written in anger but "Just the facts, Sir". Thanks much for writing and perhaps I can learn who and what your company is all about.

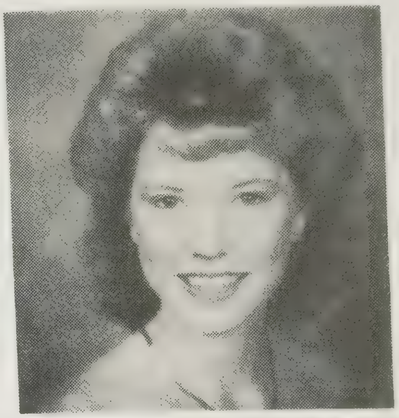
Perhaps if I had been able to attend the T/S Computer Fest, I

Continued on page 99

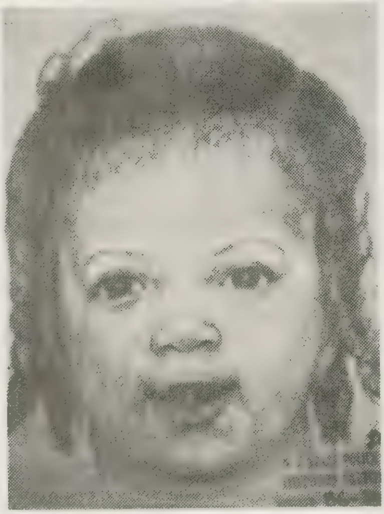
Have You Seen These Missing Children?



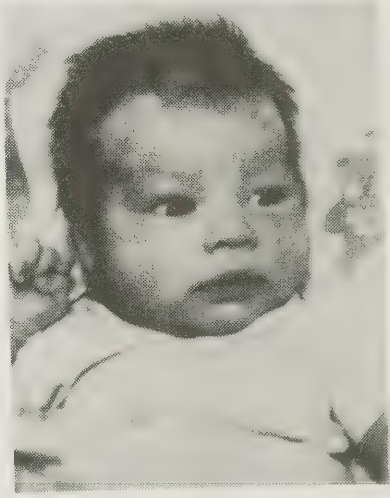
DIANE NGUYEN ROBBINS
Sex: Female DOB: 10-29-71
Race: White Eyes: Brown
Hair: Blonde Wgt: 90 lbs



MADELINE TERESA PONDS
Sex: Female DOB: 03-20-69
Race: White Eyes: Green
Hair: Blonde Wgt: 105 lbs



BONITA SANDERS
Sex: Female DOB: 09-17-84
Race: Black Eyes: Brown
Hair: Black Wgt: 30 lbs



ERICKIE FRANCISCO WETSELLIN
Sex: Male DOB: 11-21-86
Race: White Eyes: Brown
Hair: Black Wgt: 9 lbs

Contact National Center for
Missing & Exploited Children
(800) 843-5678

Coming Events

Each month we publish names, dates and other information for Computer Expos and Hamfest and other events we feel you may want to know about. We will not be held liable for mistakes i.e., wrong dates or other information as given to us. Our sole liability is to reprint the correct information.

JUNE

1 - 4 COMDEX/Spring '87 - To be held at the Georgia World Congress Center, Atlanta, GA. Additional info from The Interface Group, Inc. 300 First Avenue, Needham, MA 02194

6 - 7 Apple City Radio Club Hamfest - will be held at Rocky Reach Dam, 7 miles north of Wenatchee, Washington on U.S. Highway 97. There will be ARRL/VEC exams gives. Free camp/RV space available at the park. For additonal information please contact Merton, Hiatt Apple City Radio Club 1002 No Surry Rd., Wenstchee, WA 98801.

7 - 33rd Annual Breeze Shooters Hamfest - Will be held from 900am to 400pm at the White Swan Amusement Park, PA Rt #60 (Parkway West), near the Greater Pittsburgh International Airport. Free admission and flea market, family amusement park. Talk-in on 29.000MHz, 146.52. Direction on 146.28/88 MHz. For information please contact Bud Faulhaber, N3DOS, 1059 Balmoral Dr. Pittsburgh, PA (412) 366-5097

7 - HAARC Hamfest - To be held at the Delaware County Fairgrounds, Muncie, IN For additional info pleace contact MAARC, PO Box 936, Muncie, In 47307 - Talk-In 146.13/73

*** 5 - 7 Ham-Com 1987 -** to be held at the Arlington Convention Center, Arlington, TX between Dallas and Fort Worth. For additional information please contact: John J. Fleet II, Convention Chairman, Ham-Com Box 25028, Dallas, TX 75225 (214) 521-9430

7 - Hom-O-Rama "87" - To be held at the Erlanger Lions Park, Erlanger, KY. Additional info from NKARC PO Box 281, Florence, KY 41042 (606) 371-8545 or (606) 371-2255 Talk-In 147.855 /255 or 147.975/375

13 - Computer/Ham Fest/Flea Market - To be held at the 662 Union Hall on 109 By-pass, Anderson, IN - Hall located corner of Hillcrest Dr. and 109 By-Pass Anderson. Additional info from PO Box 1223, Anderson In, 46015-1223 - Talk-In 145.39

14 - Podunk Hollow Hamfest - For additional infor contact Egyptian Radio Club, PO Box 562, Granite City, IL 62040 - Talk-In 146.52 -

14 - The Monroe County Radio Communications Association Swap and Shop will be held Sunday at Monroe, Michigan. It will be held from 8am to 3pm. Advanced sale tickets: $2.50 - $3.00 at gate. Trunk sales $2.00 per space. Table space 50 cents per foot. For tickets or space reservations contact: Elaine Wessel, KA8RNK, PO Box 237, Monroe, MI 48161, (313) 279-1571

13 - 14 Albany Hamfest, Heritage House, Contact: Albany Amateur Radio Club, PO Box 1205, Albany, GA 31702

20-Grand Mesa Repeater Society- will hold the 8th annual Western Slope Amateur Radio and Computer Swapfest on Saturday June 20, from 9am to 4pm at the National Guard Armory. 482-28 Rd., Grand Junction, Colorado. Admission is free and wap tables are $5. each. Featurers will include an indoor swapfest. ARRL?VEC exams, an auction. Talk in on 146.22/82 and 449.20. For additional information contact Les Scott, NC0F, 2105 Yellowstone Rd., Grand Junction, CO 81503 or call (303) 242-5296

20 - 21 AMACOM New Orleans Hamfest will be held at the Rummel High School, Metairie, LA. There will be flea market, exhibitors and a dinner Saturday night. ARRL/VEC exams will be given. Additonal information contact Bill Bushnell, P.O. 73665 Metairie, LA 70033 or call at (504) 887-5022

JULY

5 - 9 - Second International Congress on Early Childhood Education - at the Childhood in the Technological Era, Tel Aviv, Israel. For additional infor contact: International Ltd. P. O. Box 29313, 61292 Tel Aviv, Israel or call (03) 65441 Telex: 33-554, In USA contact TZELL Travel, 70 West 36th St. New York, NY 10001 (212) 279-3700

***10 - 12 ARRL NATIONAL CONVENTION ATLANTA GEORGIA -** The 1987 National ARRL Convention will be held at the Georgia World Congress Center, Hall F (114.500 sq ft) full Air conditioned. For additional information please contact Roy Epps (404) 457-2916

11 - Straits Area Amateur Radio Club Swap & Shop - will be held at the Fair Grounds Petoskey, Michigan. Free RV parking Friday night for self-contained RV's. For additonal information please call (616) 347-8693 or 582-7322

12 - North Hills ARC 2nd Annual Hamfest - To be held at the Northland Library, Cumberland Rd, North Hills. - FCC Exams Additional information from Bob Ferrey, Jr, N3DOK, 9821 Presidential Dr. Allison Park, PA 15101 (412) 367-2393

12 - 13 - Indianapolis Hamfest - To be held the Marion County Fairgrounds on the southeast corner of Marion County at the intersection of I-74 & I-465. Free camper hookup facilities available - For additional info please contact William J. Evans, WB9BEN, PO Box 11776, Indianapolis, IN 46201 (317) 745-6389

26 - Maryland Hamfest and Computer Fest - will be held at the Howard County Fairgrounds, 15 miles West of Baltimore just off I-70 ar Rt. 32 on Rt 144. For complete information please contact BRATS, PO Box 5915, Baltimore, MD 21208. Talk-in on 146.16/76, 147.63/03, 146.52

AUGUST

1 - 2 - WCARS Hamfest - To be held at the WNC Agriculture Center across from Asheville Airport, Asheville, NC. Take I-26 to Exit 9) from I-40 Take I-26. Free admission, RV parking, fly-ins welcome - plenty of parking spaces. For additional information contact Brce Ponder, N4MTC, 65 Old Starnes Cove Road, Asheville, NC 28806 (704) 667-3496

2 - Porter County ARC Hamfest - To be held 49'er Drive-In Theater, Rt. 49, north of Valparaiso, IN. Gates open at 7:am (open at 6:00 am for Vendors). Surrounding area attractions are beautiful Dunes State Park near scenic Lake Michigan, Mink Lake Golfing across the road, several lakes to fish, boating, camping and an amusement park for the kids. VE testing for all classes of licenses, free parking, admission 43.50 per person (children under 12 free). Talk-in on 146.775/175 MHz and 145.45 /144.950. For further information contact Rich Stahl, K9LBO, P.O. Box 1782, Valparaiso, IN 46383

***1 - 2 - 14th Greater Jacksonville Hamfest**- The Jacksonville, Florida hamfest will be held in a new location this year at the **Prime F. Osborne Convention Center.** Will will have room for over 700 swap tables and 50 exhibitors. The new center is fully air conditioned. 850 parking spaces available and esy access of I-95. For additional information please contact Barry Baines, WD4ASW, Greater Jacksonville Hamfest Association, P.O. Box 10623, Jacksonville, FL 32207 or call (904) 350-9193

***7 - 9 - Ark-La-Tex Hamfest** - will be held at the Shreveport Convention Center, Shreveport, LA. This year marks the 25th anniversary for **10-10 International Net, Inc.** and we are very proud to have them with us. This years' hamfest will be a three day affair, beginning at 12:00 noon Friday. For additional information please contact Ark-La-Tex Hamfest, P.O. Box 37632, Shreveport, LA 71133-7632 or Robert Lance, N5GHJ (318) 686-4608

9 - 53rd Annual Hamfest - To be held at Santa Fe Park, 91st & Wolf Road, Willow Springs, IL (near Chicago) Additional info from: John Schipitsch, 13058, W9BNR, 13058 Finch Court, Lockport, Il 60441 (312) 403-1043

15 - Ozark Regional Hamfest '87 - Sponsored by the Southwest Missouri ARC. To be held at the University Plaza Trade Center (Lower Level) Springfield, MO. VE exams and other activities to keep everyone busy. For additional information please contact SMARC, Box G.S., Springfield, MO 65808

2 - Columbia, (TN) HamFest - to be held at the American Legion Post 19, Nashville Highway. VEC exams given. For additional information contact Maury ARC, George Russell, WB4JCR, PO Box 832, Columbia, TN 38402

***15 - 16 - The Huntsville Hamfest '87** - To be held in the von Braun Civic Center, Huntsville, Alabama. For dealer information please call Art Davis, WB4KKA at (205) 883-0477 or other information call Tom Alexander, K5RY, (205) 533-5082

22 - 23 - Computerfest™ '87 - Computer & Electronic Convention & Flea Market. To be held at the Hara Arena (Same place as the HamVention®) at 1001 Shiloh Springs Road, Dayton, OH 45415 (513) 278-4776

SEPTEMBER

5 - 6 - 1987 Shelby Hamfest - To be held at the Cleveland County Fair Grounds, Shelby, NC. This is one of the largest hamfest in the country with one of the largest flea markets in the country. For additional information please contact Kenneth H. Blanton, KB4EOO, Shelby ARC. P>O> Box 2206, Shelby, NC 28151-2206

12 - 13 - Mobile (AL) Hamfest - For additional information contact Warren J. Mc Carty, KB4JET, PO Box 7232, Mobile, AL 36607 (205) 865-4404 No additional information available

11 - 13 - The Electronics & Computer Expo - Will be held at the Jacksonville Convention Center downtown Jacksonville, Florida. For additional information please contact Great Southern Computer & Electronics Shows, PO Box 655, Jacksonville, FL 322012 or call at (904) 743-8000

12 - Ham-O-Rama '87 and Computerfest - To be held at the Niagara Falls Convention & Civic Center, Niagara Falls, NY. For additional information please contact Albert M. Gritzmacher, AE2T, 92 Saxton St., Lockpaort, NY 14094-4346

12 - 13 - Greater Louisville Hamfest - To be held in the West hall and the Pavilion of the Kentucky Fair and Exposition Center. The Exposition Center is located directly of I-264 and I-65. For additional information please contact Bob Karr, KD4BZ (502) 543-2877 or write to GLHA. PO Box 34444, Louisville, KY 40232

13 - BARS Hamfest '87 - To be held at Santa Fe Park, 91st & Wolf

Road, Willow Springs, IL - For additional information contact Ed Weinstein, WD9AYR 7511 Walnut Ave. Woodridge, Il 60517 (312) 985-0527 - Talk-in 146.52

13 - Butler (PA) Hamfest - To be held at the Butler Farm Show Grounds (Roe Airport) , our 10th year.For additional information contact John Varljen, K3HJH, 174 Oak Hills Heights, Butler, PA 16001 or call (412) 283-9403 talk-in on 96/36 (W3UDX), for directions 84/24 (W3WKD)

19 - 20 Superfest '87 - will be held at the Exposition Gardens, W. Northmoor Road, Peoria, IL off 6300 Block N. University. Latest information from Superfst '87, P.O. Box 3461, Peoria, IL 61614 (SASE) please.

19 - 20 - 8th Annual Wichita Amateur Radio Society Hamfest will be held at the Wichita Falls Activities Center on 10th and Indiana Street, Wichita Falls, TX. Air conditioned indoor flea market, commercial dealers, computer dealerss, FCC License examinations. RV Hookups nearby. For additional info please call (817) 723-6500

26 - Anniston (AL) Hamfest - To be held at the National Guard Armory Highway 431N (Ft McClellan Blvd), Anniston, AL. FCC Testing. Talk-in 147.04. for additional information contact Harold Romine, (205) 435-4833

26 - 12th Annual Elmira Hamfest - to be held at the Chemung County Fair Grounds in Horseheads, New York. For additional information please contact Jay at (607) 733-0761

***26 - 27 - Radio Expo** - To be held at the Lake County fair grounds at Rt 120 & 45. Between Chicago and Milwaukee, 4 miles west of I94 Toll-way. For additional information please contact Greg Pietrucha, WB9SNZ, Box 1532, Evanston, Il 60204

OCTOBER

4 - Springfield Hamfest and Computer Expo! - To be held at the Clark County Fairgrounds in Springfield, Ohio. 1/4 miles west of the intersection of interstate 70 and Ohio Rt 41 (exit 59) For additional information please contact The Independent Radio Associaton Inc., P.O. Box 523, Springfield, OH 45501

3 - 4 - Virginia Beach Hamfest - Virginia State Convention to be held at the Virginia Beach Pavillion, Virginia Beach, VA - For additional information please contact Manny Steiner, K4DOR, 3512 Olympia Lane, Virginia Beach, VA 23452 (804) 340-6105

***Houston Ham Com** - To be held 1st or 2nd weekend in Houston, Texas. For additional information please contact Robert Craig, PO Box 61081, Houston, TX 77208-1081 or call 800-231-2761 and in Texas call 800-392-0783

9 - 10 ARRL Southwestern Division Convention - To be held at the Safari Hotel & Convention Center, Scottsdale, Arizona. Guided tour of Barry Goldwaters, K7UGA shack, full round of activities for all attendees. For full details please contact C. W. Mulkin, W7KB, 6150 E. Harvard St., Scottsdale, AZ 85257 (602) 947-0296

11 - 1987 Maysville Hamfest - To be held at the Maysville Community Center one block from junction of US 17 & NC 58 in Maysville, NC - FCC Exams - For additional information please contact Bob O'Brian, W4YMI, PO Box 3, Pollocksville, NC 28573 (919) 224-6761 or David Jones, WD4LVN, PO Box 7148, Jacksonville, NC 28540 (919) 455-1221 Talk-In 146.52

10 - 11 - Central Georgia Hamfest - To be held in Warner Robins, Georgia. - FCC Exams - FREE Admission = FREE flea market - FREE dealer space - For more information contact CGARC PO Box 2585, Warner Robins, GA 31099 or call Cliff, N6DLA (912) 929-2951

13 - 15 - ROCHESTER Computer & Business Show - To be held at the Riverside Convention Center, Rochester, NY. For additional information contact: Lynette M. Massaro, 135 Delaware Ave, Suite 102, Buffalo, NY 14202, (716) 852-2006 or (800) 633-0181

***24 - 25 Hamfest Chattanooga 1987** - to be held at the Chattanooga Choo-Choo in Chattanooga, Tennessee. For additional information please contact Nita Morgan, N4DON Hamfest Chattanooga, P.O. Box 3377, Chattanooga, TN 37404

31 Nov 1 - Ham Radio & Computer Expo '87 - To be held at the Gwinnett County Fairgrounds, Lawrenceville, GA Just 20 minuts Northeast of Atlanta, GA. (this is the old Stone Mtn Hamfest) FCC Exams - RV sites with hook-ups - For further information contact: Expo '87, PO Box 1282, Stone Mountain, GA 30086

NOVEMBER

8 - Fort Wayne Hamfest - To be held at the Allen County Memorial Coliseum in Fort Wayne, IN. - For additional information please contact AC-ARTS Hamfest, PO Box 10342, Ft. Wayne, IN 46851 or call (219) 485-0164 - Talk-In 146.28/88

14 - 15 - Central Alabama Hamfest - To be held at the Garrett Coliseum, acres of parking, RV parking with hook-ups, almost unlimited tailgaters parking. For additional information pleace contact Central Alabama Hamfest, P.O. Box 3141, Montgomery, AL 36109

20 - 22 - Suncoast Convention 1987 - To be held at the St Petersburg Hilton & Towers, St Petersburg, FL - For additional information please contact FGCARC, Inc. 1556 56th Ave. North, St Petersburg, FL 33703

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PublicDomainSoftwareforHAM RADIO For Atari, 8 bit computer, $10.00. per disk. For a copy of listing, send a S.A.S.E. with return postage to Howard S. Bacon, 213 Holly Ave., So. Pittsburg, TN 37380 (1)

Timex-Sinclair TS1000 original programs for sale plus printer. For list, send large S.A.S.E. to: D.H. Berry, 2106 Opal Drive, Orlando, Florida 32822 (1)

Color SSTV on the ATARI - See August '85 QST Magazine for details. Our model #107, kit $37.80, Assembled and tested only $54.95, Program Disk $10.00. Add $2.50 shipping per order. For INFO SASE (large) **A & A Engineering,** 2521 W. LaPalma #K, Anaheim, CA 92801 (714) 952-2114 (2-3p)

IBM - APPLE - CP/M Computer Program "HAMLOG" Full function, menu-driven, edit, log, auto segregates. Over 16 modules. SASE CTM-Sandoe, PO Box 2015, Peabody, MA 01960 (11-24p)

SOFTWARENewWRITEAWAY by Midwest Software Associates, $30.00; **WORD HANDLER II,** Silicon Valley Systems, New, never opened $25.00; All software for the Apple][+ computer. May work with Apple IIe Contact Chet at **CTM Magazine**

WANTED COMPUTER EQUIPMENT

Nothing for this category this month

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Continued from page 93

would have met you and we could have discussed this in person... Thanks for taking your time to write. Chet

Packetalker Improvement

9 June 1987
Dear Chet!

Here is a little improvement on "Packetalker". I want to thank you personally for the kind praise on the article and beliving in it enough to place it on the cover. I hope that "Packetalker" will really help visually handicapped (impaired) hams to enjoy Packet radio. I also hope that the article will generate even more interest to the best ham/computer magazine available today!

Hope to meet you in Atlanta July 12th.

Sincerely,
Roger D. Dowd, WA4QAS
Bonaire, GA

Here is the update Roger talks about:

In my article "***Give your packet station the gift of gab***", Packetalker for the visually handicapped, I included a front panel switch to allow for monitoring either "Keyboard" (outgoing data) or "Packet" (incoming data). in the rush to get the thing built and working I overlooked the fact that this function can be handled by software! This would allow for both outgoing and incoming data to be monitored at the same time! Possibly eliminating the packet/keyboard switch altogether. This can be done by changing just one or two parameters on your terminal program and terminal node controller (TNC). If you use a Radio Shack Color Computer™ with "Autoterm™" terminal program, These settings should work:

DUPLEX=FULL (TERMINAL PROGRAM)
ECHO = ON (TNC)
BKONDEL = ON(TNC)

This idea came from fellow Packeteer Russ Eidemiler, WD8NPZ.

Petersburg, FL 33703

21 - 22 - FLORIDA GULF COAST ARC HAMFEST - will be held at the newly completely renovated Hilton Hotel. Full round of activities for attendees. Saturady from 9am to 5pm, Sunday from 9am to 3pm. Additional information may be had from Ms. Jean Endicott, 1556 56th Ave. North, St. Petersburg, FL 33703 (813) 525-5178

* denotes those shows **CTM Magazine** will attend as an exhibitor. SEE YOU ALL THERE!

ATTENTION Show Producers!! Send me your 1986 Show schedule and I'll include it in our "Coming Events" section, free of charge. **CTM**

Happy Packeting!
Roger D. Dowd, WA4QAS
205 Williams Drive
Bonaire, GA 31005

Roger, thanks for the update and the article in the first place. I am sure many of our subscribers will pass on this information to the right people.

I put your address since people can go directly to you rather than through me. It will save time for all involved.

I was impressed with the Packetalker for several reasons one primary one was that the U.S. Veterans Association Southeastern Rehabilitation Center will be putting ***CTM*** *on audio tape. That announcement and your Packetalker just seemed to be made for each other.*

Thanks again Roger and I hope you are working on another article now. Chet **CTM**

FREE CLASSIFIED ADS FOR SUBSCRIBERS

Operating Events

JULY

11 - 12 Oklahoma amateur radio operators will conduct their fourth annula "Field Day" exercises Saturday & Sunday at Lake Canton, OK. Activities begin at 2pm Saturday and continue until noon Sunday. Events will take place in the "Big Bend" picnic shelter. To highlight this special event, the Lake Canton Field Committee will provide a commemorative certificate for contacts with event stations WD5HPU, WA5LTM and other amateur stations which officially operate from Lake Canton during the event. Those desiring commemorative certificates should listen in the general phone portions of the 40 - 10 meter bands. Operations will also be conducted on 6 and 2 meter SSB. Operation will be in "Grid Square" EM-06. For a certificate, send QSL and Large SASE to Lake Canton Field Day, P.O. Box 19097, Oklahoma City, OK 73144.

*** This is a new service of CTM Magazine. If there is sufficient interest, it will be a regular feature. Send us information on your SPECIAL OPERATING EVENTS and we will list them here as space permits. CTM**

Continued from previous page

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HAM EQUIPMENT WANTED

Nothing for this category this month

#1 Source of PACKET Info

CTM

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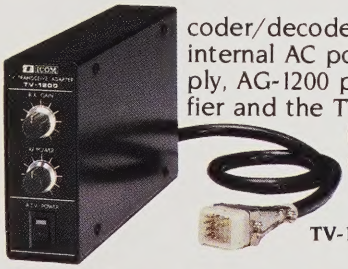

TV-1200

The IC-12AT handheld covers from 1260–1299.990MHz, has ten memory channels, memory scan, program scan and programmable offset. It also features an LCD readout, RIT and VXO, 32 built-in tones and a DTMF pad.

The new IC-1200 1.2GHz mobile transceiver has 21 memory channels, scanning, an HM-14 up/down scanning mic, RIT, large LCD readout and 10 watts power output. Accessories include the PS-45 slim-line external power supply.

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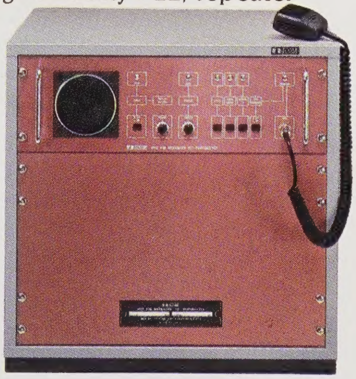

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You also get a high/low power switch, power meter, backlit display, 500-mAh battery, wall charger, and soft case. Plus a choice of many interchangeable options, including a VOX headset, fast charger, hard leather case, and plug-in subaudible tone encoder/decoder for controlled-access repeaters.

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- **Packet Compatible (with front panel DATA switch)**
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When you're ready to experience all the multimode excitement 2 meters offers today's amateur, you're ready for the glamorous new IC-275. Its FM capabilities are unlimited, its wideband receiver coverage (138 to 174MHz, Tx 140.1 to 150MHz) includes public services and NOAA weather bands, plus CAP and MARS, and its SSB/CW operations are an OSCAR enthusiast's and VHF DX'er's delight. No other VHF transceiver is comparable to the IC-275 in features, performance, reliability and ease of operation.

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The Matching ICOM IC-475 UHF Transceiver is also jam-packed with deluxe multimode features, and it's the ultimate OSCAR mate for the IC-275. Two versions, the 25 watt **IC-475A** and the 75 watt **IC-475H**, are available to suit your needs.

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